Allen-Bradley

PowerFlex™ Communications

DeviceNet Adapter

22-COMM-D
FRN 1.xxx

User Manual

Rockwell Automation

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. "*Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls*" (Publication SGI-1.1 available from your local Rockwell Automation Sales Office or online at **http://www.ab.com/manuals/gi**) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual we use notes to make you aware of safety considerations.

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.

Attentions help you:

- identify a hazard
- avoid the hazard
- recognize the consequences

Important: Identifies information that is especially important for successful application and understanding of the product.

Shock Hazard labels may be located on or inside the drive to alert people that dangerous voltage may be present.

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RSLinx, RSLogix, and RSNetWorx are trademarks of Rockwell Software.

DeviceNet is a trademark of the Open DeviceNet Vendor Association.

Windows, Windows CE, Windows NT, and Microsoft are either registered trademarks or trademarks of Microsoft Corporation.

Summary of Changes

This is the first release of the DeviceNet adapter FRN 1.xxx.

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Related Documentation

For:	Refer to:	Publication
DeviceNet™ Cables and Components	*DeviceNet Product Overview*	DN-2.5
DeviceNet Network Installation	*DeviceNet Cable System Planning and Installation Manual*	DN-6.7.2
DeviceNet Networks	*DeviceNet Starter Kit*	DN-6.5.16
DriveExplorer™	*DriveExplorer Getting Results Manual* Online help (installed with the software)	9306-5.2
DriveTools 2000™	*DriveTools 2000 Online Help*	–
HIM	*HIM Quick Reference*	22HIM-QR001…
Logix 5550	*ControlLogix DeviceNet Scanner Installation Instructions*	1756-5.66
PowerFlex™ 4 Drive	*PowerFlex 4 User Manual* *PowerFlex 4 Quick Start*	22A-UM001… 22A-QS001…
PowerFlex™ 40 Drive	*PowerFlex 40 User Manual* *PowerFlex 40 Quick Start*	22B-UM001… 22B-QS001…
RSLinx™	*Getting Results with RSLinx* Online help (installed with the software)	9399-WAB32GR
RSLogix™ 5	*RSLogix 5 Getting Results Guide* Online help (installed with the software)	9399-RL53GR
RSLogix 500	*RSLogix 500 Getting Results Guide* Online help (installed with the software)	9399-RL50GR
RSLogix 5000	*RSLogix 5000 Getting Results Guide* Online help (installed with the software)	9399-RLD300GR
RSNetWorx™ for DeviceNet	*RSNetWorx for DeviceNet Getting Results Guide* Online help (installed with the software)	9398-DNETGR
SLC 500™ and 1747-SDN	*DeviceNet Scanner Module Installation Instructions* *DeviceNet Scanner Module Configuration Manual*	1747-5.8 1747-6.5.2
PLC-5™ and 1771-SDN	*DeviceNet Scanner Module Installation Instructions* *DeviceNet Scanner Module Configuration Manual*	1747-5.14 1771-6.5.118

Documentation can be obtained online at http://www.ab.com/manuals.

Conventions Used in this Manual

The following conventions are used throughout this manual:

- Parameter names are shown in the following format **Parameter xx - [*]**. The xx represents the parameter number. The * represents the parameter name. For example **Parameter 01 - [Mode]**.
- Menu commands are shown in bold type face and follow the format **Menu > Command**. For example, if you read "Select **File > Open**," you should click the **File** menu and then click the **Open** command.
- RSNetWorx for DeviceNet (version 4.01), RSLinx (version 2.40), and RSLogix5000 (version 11) were used for the screen shots in this manual. Different versions of the software may differ in appearance and procedures.
- The firmware release is displayed as FRN X.xxx. The "FRN" signifies Firmware Release Number. The "X" is the major release number. The "xxx" is the minor update number. This manual is for Firmware release 1.xxx.
- This manual provides information about the DeviceNet adapter and using it with PowerFlex 40 drives. The adapter can be used with other products that support an internal DSI adapter. Refer to the documentation for your product for specific information about how it works with the adapter.

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Technical Product Assistance

If you need to contact Rockwell Automation, Inc. for technical assistance, please review the information in Chapter 8, Troubleshooting first. If you still have problems, then call your local Rockwell Automation, Inc. representative.

Getting Started

The 22-COMM-D DeviceNet adapter is a communication option intended for installation into a PowerFlex 40 drive. It can also be used with other Allen-Bradley products that support an internal DSI adapter. The Multi-Drive feature (Chapter 7) also provides a means for PowerFlex 4 drives and other DSI Hosts to connect to DeviceNet.

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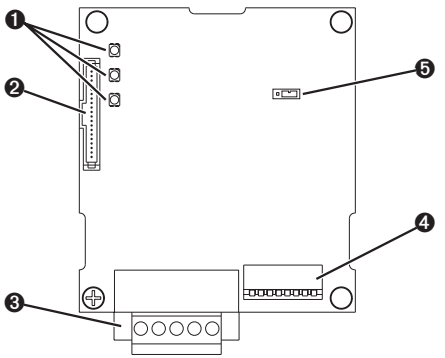
Components

Figure 1.1 Components of the Adapter



Item	Part	Description
❶	Status Indicators	Three LEDs that indicate the status of the connected drive, adapter, and network. Refer to Chapter 8, Troubleshooting.
❷	DSI Connector	A 20-pin, single-row shrouded male header. An Internal Interface cable is connected to this connector and a connector on the drive.
❸	DeviceNet Connector	A 5-pin connector to which a 5-pin linear plug can be connected.
❹	Node Address/ Rate Switches	Switches for setting the node address and network data rate. Refer to Chapter 2, Installing the Adapter.
❺	Mode Jumper (J2)	Selects Single or Multi-Drive mode of operation. Refer to Chapter 2, Installing the Adapter.

Features

The DeviceNet adapter features the following:

- The adapter is mounted in the PowerFlex 40 drive. It receives the required power from the drive and from the DeviceNet network.
- Switches let you set a node address and network data rate before applying power to the PowerFlex drive. Alternately, you can disable the switches and use parameters to configure these functions.
- A jumper lets you select between Single or Multi-Drive mode of operation. In Single mode, the adapter represents a single drive on one node. In Multi-Drive mode, the adapter represents up to 5 drives on one node.
- A number of configuration tools can be used to configure the adapter and connected drive. The tools include an external PowerFlex 4-Class HIM (22-HIM-*), network software such as RSNetWorx for DeviceNet, or drive-configuration software such as DriveExplorer (version 3.01 or higher) or DriveTools 2000 (version 1.01 or higher).
- Status indicators report the status of the drive communications, adapter, and network.
- I/O, including Logic Command/Reference, may be configured for your application using a parameter.
- Explicit and UCMM (Unconnected Message Manager) Messages are supported.
- Multiple data exchange methods, including Polled, Cyclic, and Change of State (COS), can be used to transmit data between the network and adapter.
- User-defined fault actions determine how the adapter and PowerFlex drive respond to communication disruptions on the network and controllers in idle mode.
- Faulted node recovery is supported. You can configure a device even when it is faulted on the network if you have a configuration tool that uses faulted node recovery and have properly set the adapter node address switches and data rate switches.

Compatible Products

The DeviceNet adapter is compatible with Allen-Bradley PowerFlex drives and other products that support an internal DSI adapter. At the time of publication, compatible products include:

- PowerFlex 40 drives

The Multi-Drive feature (Chapter 7) also provides a means for PowerFlex 4 drives and other DSI Hosts to connect to DeviceNet.

Required Equipment

Equipment Shipped with the Adapter

When you unpack the adapter, verify that the package includes:

- ❑ One DeviceNet adapter
- ❑ One five-pin linear DeviceNet plug (connected to the DeviceNet connector on the adapter)
- ❑ A 15.24 cm (6 in.) Internal Interface Cable
- ❑ One grounding wrist strap
- ❑ This manual

User-Supplied Equipment

To install and configure the DeviceNet adapter, you must supply:

- ❑ A small flathead screwdriver
- ❑ DeviceNet cable
  - – Thin cable with an outside diameter of 6.9 mm (0.27 in.) is recommended
- ❑ Configuration tool, such as:
  - – PowerFlex 4-Class HIM (22-HIM-*)
  - – DriveExplorer (version 3.01 or higher)
  - – DriveTools 2000 (version 1.01 or higher)
  - – RSNetWorx for DeviceNet
  - – Serial Converter (22-SCM-232)
- ❑ Computer with a DeviceNet communications adapter installed (Examples: 1784-PCD, 1784-PCID, 1784-PCIDS, or 1770-KFD)
- ❑ Controller configuration software (Examples: RSLogix5, RSLogix500, or RSLogix 5000)

Safety Precautions

Please read the following safety precautions carefully:

ATTENTION: Risk of injury or death exists. The PowerFlex drive may contain high voltages that can cause injury or death. Remove all power from the PowerFlex drive, and then verify power has been removed before installing or removing an adapter.

ATTENTION: Risk of injury or equipment damage exists. Only personnel familiar with drive and power products and the associated machinery should plan or implement the installation, start-up, configuration, and subsequent maintenance of the product using a DeviceNet adapter. Failure to comply may result in injury and/or equipment damage.

ATTENTION: Risk of injury or equipment damage exists. If the DeviceNet adapter is transmitting control I/O to the drive, the drive may fault when you reset the adapter. Determine how your drive will respond before resetting an adapter.

ATTENTION: Risk of injury or equipment damage exists. **Parameters 7 - [Comm Flt Action]** and **8 - [Idle Flt Action]** let you determine the action of the adapter and connected PowerFlex drive if communications are disrupted. By default, these parameters fault the PowerFlex drive. You can set these parameters so that the PowerFlex drive continues to run. Precautions should be taken to ensure that the settings of these parameters do not create a hazard of injury or equipment damage.

ATTENTION: Hazard of injury or equipment damage exists. When a system is configured for the first time, there may be unintended or incorrect machine motion. Disconnect the motor from the machine or process during initial system testing.

ATTENTION: Hazard of injury or equipment damage exists. The examples in this publication are intended solely for purposes of example. There are many variables and requirements with any application. Rockwell Automation, Inc. does not assume responsibility or liability (to include intellectual property liability) for actual use of the examples shown in this publication.

Quick Start

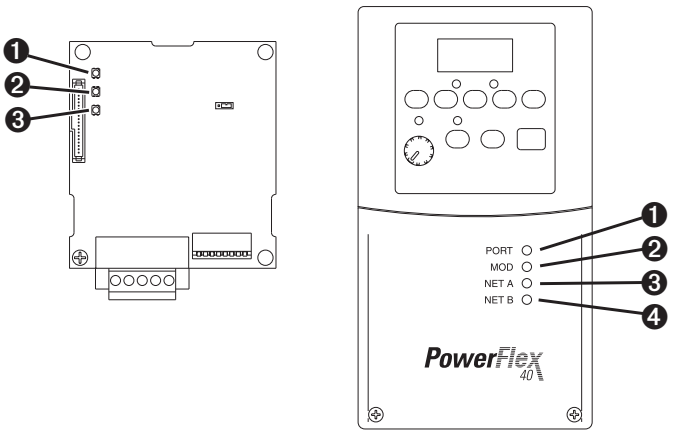
This section is designed to help experienced users start using the DeviceNet adapter. If you are unsure how to complete a step, refer to the referenced chapter.

Step		Refer to
1	**Review the safety precautions for the adapter.**	Throughout This Manual
2	**Verify that the PowerFlex drive is properly installed.**	Drive User Manual
3	**Commission the adapter.** Set a unique node address and the appropriate data rate using the switches on the adapter. If desired, you can disable the switches and use parameter settings instead.	Chapter 2, Installing the Adapter
4	**Install the adapter.** Verify that the PowerFlex drive and DeviceNet network are not powered. Then, connect the adapter to the network using a DeviceNet cable and to the drive using the Internal Interface cable. Use the captive screws to secure and ground the adapter to the drive.	
5	**Apply power to the adapter.** The adapter receives power from the drive and network. Apply power to the network and to the drive. The status indicators should be green. If they flash red, there is a problem. Refer to Chapter 8, Troubleshooting.	
6	**Configure the adapter for your application.** Set the following parameters for the adapter as required by your application: • Node address and data rate. • I/O configuration. • Change of State, Cyclic, or polled I/O data exchange. • Fault actions.	Chapter 3, Configuring the Adapter
7	**Apply power to the DeviceNet master and other devices on the network.** Verify that the master and network are installed and functioning in accordance with DeviceNet standards, and then apply power to them.	DeviceNet Cable System Planning and Installation Manual
8	**Configure the scanner to communicate with the adapter.** Use a network tool such as RSNetWorx for DeviceNet to configure the scanner on the network. Make sure to: • Set up the scan list. • Map the adapter data to the scan list. • Save your DeviceNet configuration to the scanner and a file.	Chapter 4, Configuring the Scanner
9	**Create a ladder logic program.** Use a programming tool such as RSLogix to create a ladder logic program that enables you to do the following: • Control the adapter and connected drive. • Monitor or configure the drive using Explicit Messages.	Chapter 5, Using I/O Messaging Chapter 6, Using Explicit Messaging

Modes of Operation

The adapter uses three status indicators to report its operating status. They can be viewed through the drive cover. See Figure 1.2.

Figure 1.2 Status Indicators *(location on drive may vary)*



Item	Status Indicator	Status[1]	Description
❶	PORT	Green	Normal Operation. The adapter is properly connected and is communicating with the drive.
		Flashing Green	The adapter is in the process of establishing a connection to the drive. This status indicator will turn solid green or red.
❷	MOD	Green	Normal Operation. The adapter is operational and is transferring I/O data.
		Flashing Green	Normal Operation. The adapter is operational but is not transferring I/O data.
❸	NET A	Green	Normal Operation. The adapter is properly connected and communicating on the network.
		Flashing Green	The adapter is properly connected but is not communicating with any devices on the network.
❹	NET B	Off	Not used for DeviceNet.

(1) If all status indicators are off, the adapter is not receiving power. Refer to Chapter 2, Installing the Adapter, for instructions on installing the adapter. If any other conditions occur, refer to Chapter 8, Troubleshooting.

Installing the Adapter

Chapter 2 provides instructions for installing the adapter in a PowerFlex 40 drive.

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Preparing for an Installation

Before installing the DeviceNet adapter:

- Read the *DeviceNet Product Overview Manual*, Publication DN-2.5, and the *DeviceNet Cable System Planning and Installation Manual*, Publication DN-6.7.2. These manuals will provide information on selecting cables, setting up a network, and network basics.
- Verify that you have all required equipment. Refer to Chapter 1, Getting Started.

Commissioning the Adapter

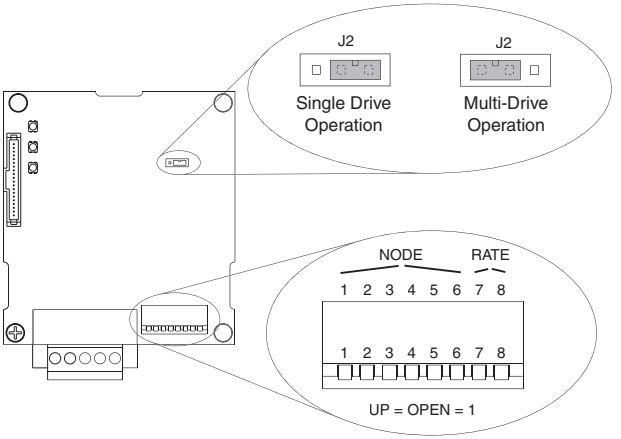
To commission the adapter, you must set a unique node address and the data rate that is used by the network. (Refer to the Glossary for details about data rates and node addresses.)

Important: New settings are recognized only when power is applied to the adapter. If you change a setting, cycle power.

ATTENTION: Risk of equipment damage exists. The DeviceNet adapter contains ESD (Electrostatic Discharge) sensitive parts that can be damaged if you do not follow ESD control procedures. Static control precautions are required when handling the adapter. If you are unfamiliar with static control procedures, refer to *Guarding Against Electrostatic Damage*, Publication 8000-4.5.2.

1. Set the adapter node address and data rate switches (see Figure 2.1, Figure 2.2, and Figure 2.3).

Figure 2.1 Setting Node Address/Data Rate Switches and Single/Multi-Drive Operation Jumper



Switches	Description	Default	
SW 1	Least Significant Bit (LSB) of Node Address	1	Node 63
SW 2	Bit 1 of Node Address	1	
SW 3	Bit 2 of Node Address	1	
SW 4	Bit 3 of Node Address	1	
SW 5	Bit 4 of Node Address	1	
SW 6	Most Significant Bit (MSB) of Node Address	1	
SW 7	Least Significant Bit (LSB) of Data Rate	1	Autobaud
SW 8	Most Significant Bit (MSB) of Data Rate	1	

Figure 2.2 Node Address Switch Settings (UP = OPEN = 1)

Switch Setting						Node	Switch Setting						Node
SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	Address	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	Address
0	0	0	0	0	0	0	1	0	1	1	0	0	13
1	0	0	0	0	0	1	0	1	1	1	0	0	14
0	1	0	0	0	0	2	1	1	1	1	0	0	15
1	1	0	0	0	0	3	0	0	0	0	1	0	16
0	0	1	0	0	0	4	1	0	0	0	1	0	17
1	0	1	0	0	0	5	0	1	0	0	1	0	18
0	1	1	0	0	0	6	1	1	0	0	1	0	19
1	1	1	0	0	0	7	0	0	1	0	1	0	20
0	0	0	1	0	0	8	1	0	1	0	1	0	21
1	0	0	1	0	0	9	0	1	1	0	1	0	22
0	1	0	1	0	0	10	1	1	1	0	1	0	23
1	1	0	1	0	0	11	0	0	0	1	1	0	24
0	0	1	1	0	0	12	1	0	0	1	1	0	25

Figure 2.2 Node Address Switch Settings (UP = OPEN = 1) (Continued)

Switch Setting						Node	Switch Setting						Node
SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	Address	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	Address
0	1	0	1	1	0	26	1	0	1	1	0	1	45
1	1	0	1	1	0	27	0	1	1	1	0	1	46
0	0	1	1	1	0	28	1	1	1	1	0	1	47
1	0	1	1	1	0	29	0	0	0	0	1	1	48
0	1	1	1	1	0	30	1	0	0	0	1	1	49
1	1	1	1	1	0	31	0	1	0	0	1	1	50
0	0	0	0	0	1	32	1	1	0	0	1	1	51
1	0	0	0	0	1	33	0	0	1	0	1	1	52
0	1	0	0	0	1	34	1	0	1	0	1	1	53
1	1	0	0	0	1	35	0	1	1	0	1	1	54
0	0	1	0	0	1	36	1	1	1	0	1	1	55
1	0	1	0	0	1	37	0	0	0	1	1	1	56
0	1	1	0	0	1	38	1	0	0	1	1	1	57
1	1	1	0	0	1	39	0	1	0	1	1	1	58
0	0	0	1	0	1	40	1	1	0	1	1	1	59
1	0	0	1	0	1	41	0	0	1	1	1	1	60
0	1	0	1	0	1	42	1	0	1	1	1	1	61
1	1	0	1	0	1	43	0	1	1	1	1	1	62
0	0	1	1	0	1	44	1	1	1	1	1	1	63

Figure 2.3 Data Rate Switch Settings (UP = OPEN = 1)

Switch Setting		Data
SW 7	SW 8	Rate
0	0	125 kbps
1	0	250 kbps
0	1	500 kbps
1	1	Autobaud

If all switches are in the CLOSED position (all 0's), then the Node Address and Data Rate are determined by parameter settings (**Parameter 02 - [DN Addr Cfg]** and **Parameter 04 - [DN Rate Cfg]**).

2. Set the adapter mode jumper for Single or Multi-Drive operation (see Figure 2.1 and these setting descriptions).

Jumper Setting	Description
Right position or jumper missing	Sets the adapter for Single drive mode (default setting) using a single drive connection. **Important:** In this mode, connections to multiple drives must be removed since all powered and connected hosts will respond to any message sent by the adapter.
Left position	Sets the adapter for Multi-Drive operation mode using up to 5 different drives. DSI peripherals do not operate with the adapter in this mode.

Connecting the Adapter to the Network

ATTENTION: Risk of injury or death exists. The PowerFlex drive may contain high voltages that can cause injury or death. Remove all power from the PowerFlex drive, and then verify power has been removed before installing or removing an adapter.

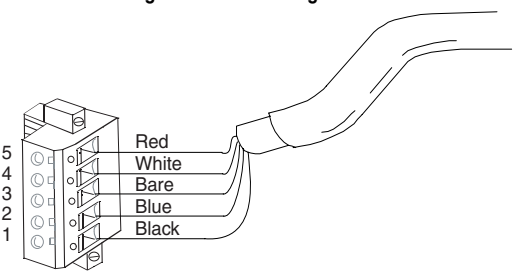
1. Remove power from the drive.
2. Use static control precautions.
3. Remove the drive cover.
4. Connect a DeviceNet cable to the network, and route it through the bottom of the PowerFlex drive. DeviceNet Thin cable with an outside diameter of 6.9 mm (0.27 in.) is recommended. (See Figure 2.6.)

   Important: Maximum cable length depends on data rate. Refer to the Glossary, Data Rate.

5. Connect a 5-pin linear plug to the DeviceNet cable.

   A 10-pin linear plug is not supported. A 5-pin linear plug is shipped with the adapter.

Figure 2.4 Connecting a 5-Pin Linear Plug to the Cable



Terminal	Color	Signal	Function
5	Red	V+	Power Supply
4	White	CAN_H	Signal High
3	Bare	SHIELD	Shield
2	Blue	CAN_L	Signal Low
1	Black	V–	Common

6. Insert the DeviceNet cable plug into the mating adapter receptacle, and secure it with the two screws. (See Figure 2.5, item 2.) Verify that the colors of the wires on the plug match up with the color codes on the receptacle.

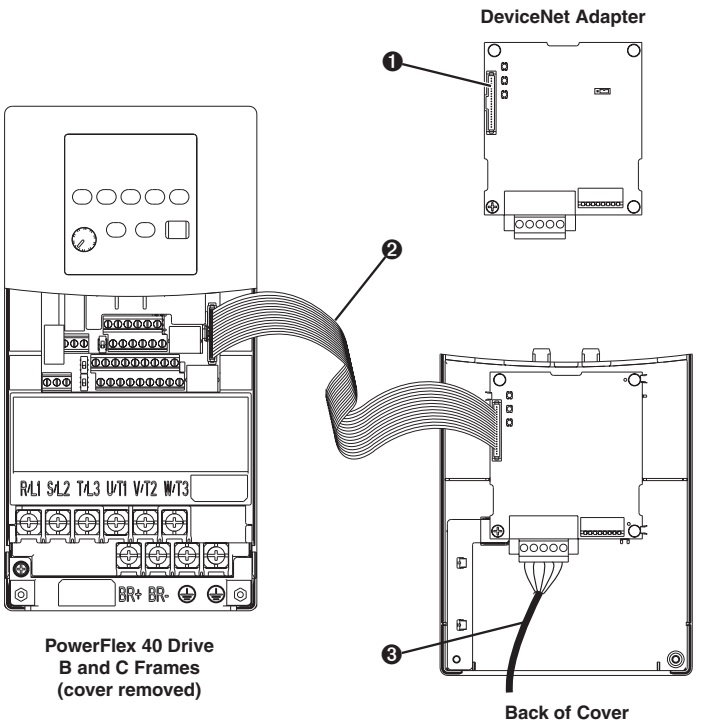
Connecting the Adapter to the Drive

1. Remove power from the drive.
2. Use static control precautions.
3. Mount the adapter on the cover, using the screw on the adapter to secure it in place.

Important: Tighten the screw in the lower left hole to ground the adapter (see Figure 2.6).

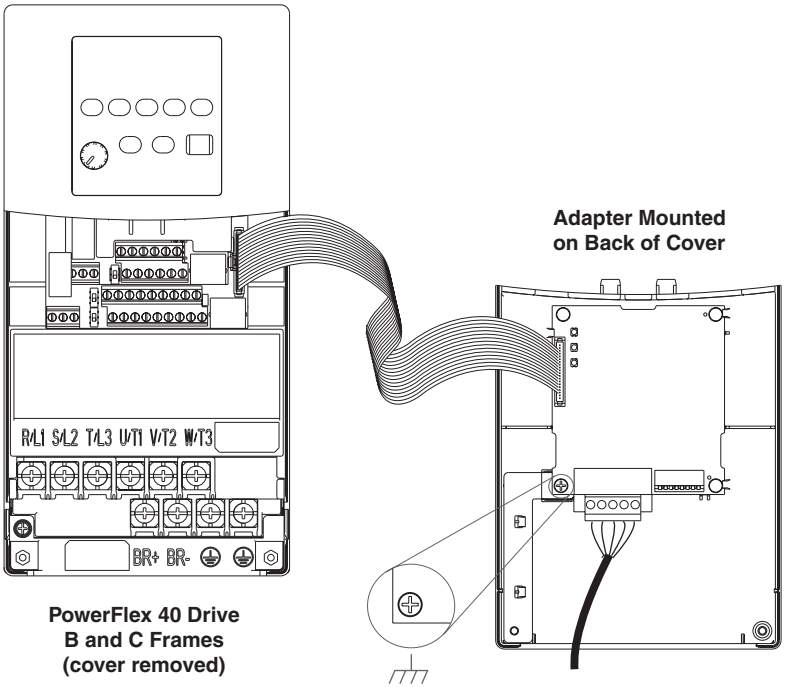
4. Connect the Internal Interface cable to the DSI port on the drive and then to the mating DSI connector on the adapter.

Figure 2.5 DSI Ports and Internal Interface Cables



#	Description
❶	DSI Connector
❷	15.24 cm (6 in.) Internal Interface cable
❸	DeviceNet cable

Figure 2.6 Mounting the Adapter



Applying Power

ATTENTION: Risk of equipment damage, injury, or death exists. Unpredictable operation may occur if you fail to verify that parameter settings and switch settings are compatible with your application. Verify that settings are compatible with your application before applying power to the drive.

1. Reinstall the cover on the drive. The status indicators can be viewed on the front of the drive after power has been applied.

2. Ensure that the adapter will have a unique address on the network and is set at the correct data rate or to autobaud. If a new data rate or address is needed, reset its switches (refer to Commissioning the Adapter in this chapter).

3. Apply power to the PowerFlex drive. The adapter receives its power from the connected drive and network. When you apply power to the product and network for the first time, the status indicators should be green after an initialization. If the status indicators go red, there is a problem. Refer to Chapter 8, Troubleshooting.

4. If the software settings for the data rate and node address are to be used, a configuration tool such as DriveExplorer can be used to adjust the respective parameters in the adapter.

Notes:

Configuring the Adapter

Chapter 3 provides instructions and information for setting the parameters in the adapter.

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For a list of parameters, refer to Appendix B, Adapter Parameters. For definitions of terms in this chapter, refer to the Glossary.

Configuration Tools

The DeviceNet adapter stores parameters and other information in its own non-volatile memory. You must, therefore, access the adapter to view and edit its parameters. The following tools can be used to access the adapter parameters:

Tool	Refer To:
DriveExplorer Software (version 3.01 or higher)	*DriveExplorer Getting Results Manual*, Publication 9306-5.3, or the online help
DriveTools 2000 Software (version 1.01 or higher)	*DriveTools 2000 Online Help*
PowerFlex 4-Class HIM (22-HIM-*)	page 3-2
RSNetWorx for DeviceNet Software	page 3-3

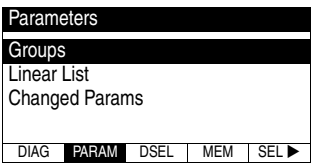
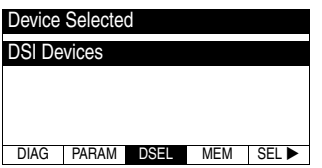
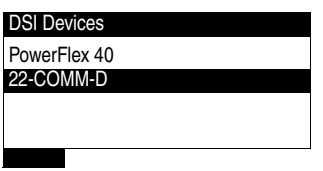
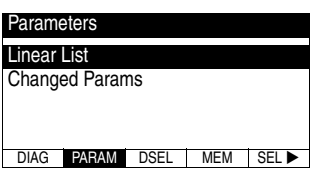
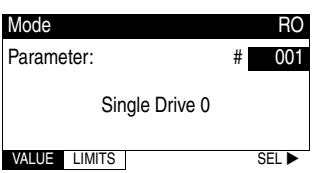
RSNetWorx for DeviceNet (version 4.01) and RSLinx (version 2.40) were used for examples in this manual. Different versions of software may differ in appearance and procedures.

TIP: Explicit Messaging can also be used to configure an adapter and drive. Refer to Chapter 6, Using Explicit Messaging.

Using the PowerFlex 4-Class HIM

The PowerFlex 4-Class HIM (Human Interface Module) can be used to access parameters in the adapter (see basic steps shown below). It is recommended that you read through the steps for your HIM before performing the sequence. For additional HIM information, refer to your HIM Quick Reference card.

Using the HIM

Step	Key(s)	Example Screens
1. Power up the drive. Then plug the HIM into the drive. The **Parameters** menu for the drive will be displayed.		
2. Press Sel key once to display the **Device Select** menu.	Sel	
3. Press Enter to display the **DSI Devices** menu. Press Down Arrow to scroll to 22-COMM-D.	Enter and ▼	
4. Press Enter to select the DeviceNet adapter. The **Parameters** menu for the adapter will be displayed.	Enter	
5. Press Enter to access the parameters. Edit the adapter parameters using the same techniques that you use to edit drive parameters.	Enter	

Using RSNetWorx for DeviceNet

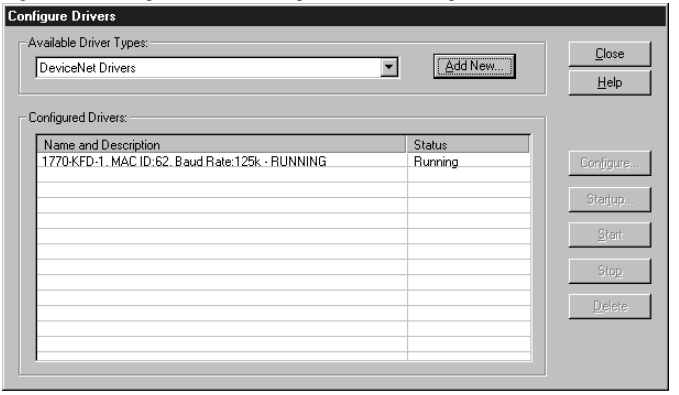
RSNetWorx for DeviceNet is a Rockwell Software application that can be used to set up DeviceNet networks and configure connected devices.

To set up RSLinx for RSNetWorx for DeviceNet

To use RSNetWorx for DeviceNet, you must first set up a driver in RSLinx. The driver provides a communications link between the computer and DeviceNet network.

Step	Icons
1. Start RSLinx, and select **Communications > Configure Drivers** to display the Configure Drivers dialog box. 2. In the Available Driver Types box, select **DeviceNet Drivers**, and then click **Add New**. The DeviceNet Driver Selection dialog box appears. 3. In the Available DeviceNet Drivers list, select the adapter connected to your computer, and then click **Select**. A Driver Configuration dialog box appears. 4. Configure the driver for your computer and network settings, and then click **OK**. The Configure Drivers dialog box reports the progress of the configuration. Then, the Add New RSLinx Driver dialog box appears. 5. Type a name (if desired), and then click **OK**. The Configure Drivers dialog box reappears, and the new driver is in the Configured Drivers List (Figure 3.1). 6. Click **Close** to close the dialog box. Leave RSLinx running.	Shortcut to RSLinx

Figure 3.1 Configure Drivers Dialog Box with a Configured Driver

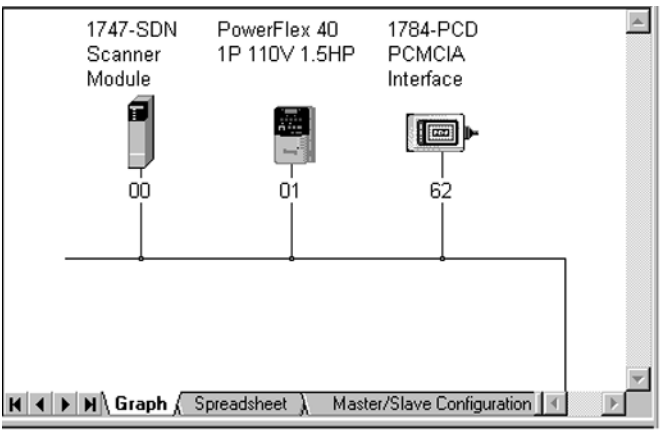


To go online with RSNetWorx for DeviceNet

You can view the devices on a DeviceNet network by going online. A device may appear as an unrecognized device if RSNetWorx for DeviceNet does not have an EDS file for it.

Step	Icons
1. After setting up a driver in RSLinx, start RSNetWorx for DeviceNet. 2. Select **Network > Online**. If the Browse for Network dialog box appears, RSLinx has multiple drivers configured. Select your DeviceNet network, and click **OK**. A prompt appears. 3. RSNetWorx browses the network and any devices on the network appear in the Configuration View. You can select Graph, Spreadsheet, or Master/Slave views. Figure 3.2 shows an example network in a Graph view.	Shortcut to RSNetWorx

Figure 3.2 Example DeviceNet Network

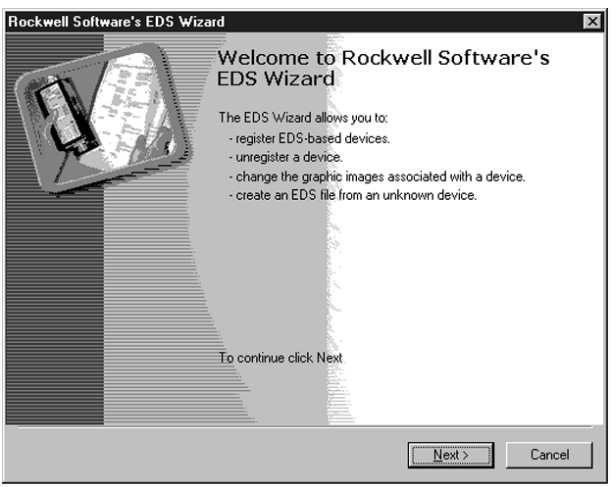


To create an EDS file

If the adapter and drive appear as an unrecognized device, create an EDS file for it.

Step	Icons
1. Right-click the “Unrecognized Device” icon, and select **Register Device** in the menu. The EDS Wizard (Figure 3.3) appears. 2. Click **Next** to display the next step. 3. Select **Upload EDS**, and then click **Next**. 4. Type a description (if desired), and then click **Next**. 5. Under Polled, select **Enabled**, type **4** in the Input Size and Output Size boxes, and then click **Next**. RSNetWorx will upload the EDS file from the drive and adapter. 6. Click **Next** to display the icon options for the node. We recommend that you use the icon for your product. You can change icons by clicking **Change icon**. 7. Click **Next** to view a summary, and then click **Next** again to accept it. 8. Click **Finish** to finish the EDS creation. A new icon represents the PowerFlex drive and adapter in the Configuration View.	

Figure 3.3 EDS Wizard

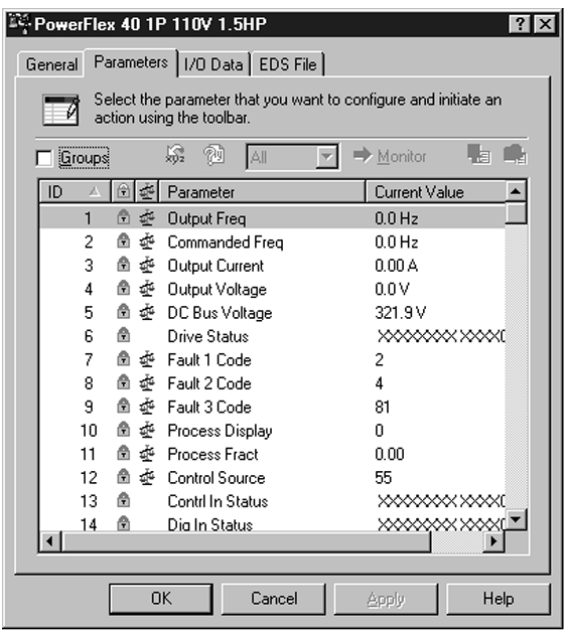

Rockwell Software's EDS Wizard
Welcome to Rockwell Software's EDS Wizard
The EDS Wizard allows you to:
- register EDS-based devices.
- unregister a device.
- change the graphic images associated with a device.
- create an EDS file from an unknown device.
To continue click Next
Next >
Cancel

To access and edit parameters

Parameters in the drive and adapter can be edited with RSNetWorx. The adapter parameters are appended to the list of drive parameters.

Step	Icons
1. After creating an EDS file, right-click on the icon for the PowerFlex drive and adapter and select **Properties**. The PowerFlex Drive dialog box appears.	PowerFlex 40 1P 110V 1.5HP
2. Click the **Parameters** tab (Figure 3.4). If an EDS Editor message appears, click **Upload** to load the parameter values in the drive to the computer. Parameters are displayed in numerical order. You can either scroll through the list or select a specific group of parameters in the Groups box. The available groups and the numbers of the adapter parameters will vary based on the type of drive that is connected to the adapter.	 01
3. In the Current Value column, double-click a value to edit it.	
4. Click **Apply** to save changes to the device.	

Figure 3.4 Example PowerFlex Drive Dialog Box

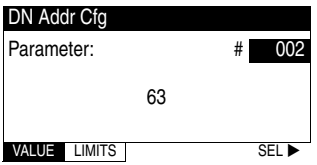


Setting the Node Address

The value of **Parameter 02 - [DN Addr Cfg]** determines the node address if all of the adapter DIP switches are in the CLOSED position (all 0's). We recommend that you do not use node address 63 because all new devices use it as the default address. Address 63 is also used for Automatic Device Recovery (ADR).

1. Set the value of **Parameter 02 - [DN Addr Cfg]** to a unique node address.

Figure 3.5 DeviceNet Node Address Screen on PowerFlex 4-Class HIM (22-HIM-*)



Default = 63

2. Reset the adapter. Refer to Resetting the Adapter section in this chapter.

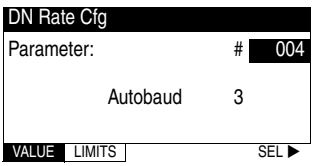
TIP: If you are using RSNetWorx for DeviceNet, select **Network > Single Browse Path** to see the new address; then delete the old address.

Setting the Data Rate

The value of **Parameter 04 - [DN Rate Cfg]** determines the DeviceNet data rate if all of the adapter DIP switches are in the CLOSED position (all 0's). The Autobaud setting will detect the data rate used on the network if another device is setting the data rate. Your application may require a different setting.

1. Set the value of **Parameter 04 - [DN Rate Cfg]** to the data rate at which your network is operating.

Figure 3.6 DeviceNet Data Rate Screen on PowerFlex 4-Class HIM (22-HIM-*)



Value	Baud Rate
0	125 kbps
1	250 kbps
2	500 kbps
3	Autobaud (Default)

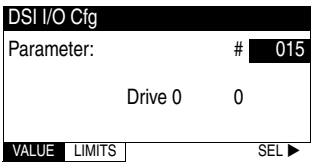
2. Reset the adapter. Refer to Resetting the Adapter section in this chapter.

Setting the I/O Configuration

The I/O configuration determines the number of drives that will be represented on the network as one node by the adapter. If the Mode Jumper is set to the Single mode position, only one drive is represented by the adapter and **Parameter 15 - [DSI I/O Cfg]** has no effect. If the Mode Jumper is set to the Multi-Drive position, up to five drives can be represented as one node by the adapter.

1. Set the value in **Parameter 15 - [DSI I/O Cfg]**:

Figure 3.7 I/O Configuration Screen on PowerFlex 4-Class HIM (22-HIM-*)



Value	Description	Mode Jumper Position	
		Single	Multi-Drive
0	Drive 0 (Default)	✓	✓
1	Drives 0-1		✓
2	Drives 0-2		✓
3	Drives 0-3		✓
4	Drives 0-4		✓

Drive 0 is the PowerFlex 40 with the 22-COMM-D adapter installed. Drive 1 through 4 are PowerFlex 4 and/or 40 drives that multi-drop to the RJ45 (RS-485) port on Drive 0. Refer to Chapter 7, Using Multi-Drive Mode for more information.

2. If a drive is enabled, configure the parameters in the drive to accept the Logic Command and Reference from the adapter. For example, set **Parameters 36 - [Start Source]** and **38 - [Speed Reference]** in a PowerFlex 40 drive to "DSI Port 5."

3. Reset the adapter. Refer to Resetting the Adapter section in this chapter.

Selecting COS, Cyclic, or Polled I/O

The data exchange (sometimes called allocation) is the method that the adapter uses to exchange data on the DeviceNet network. The adapter can be configured to use one of the following data exchanges:

- COS (Change of State)
- Cyclic
- Polled
- Polled and COS
- Polled and Cyclic

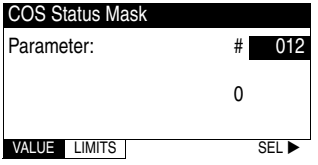
If "Polled and COS" or "Polled and Cyclic" is used, the adapter receives the I/O from the polled messages. It transmits its Logic Status and Feedback in COS or Cyclic messages. Other data is transmitted in Polled messages.

Cyclic and Polled data exchanges are configured in the scanner, so you only need to set the I/O configuration in the adapter. COS data exchange must be configured in both the adapter and the scanner. You need to set the I/O configuration and COS parameters in the adapter.

To use COS (Change of State) data exchange

1. Set the bits in the Logic Status word that should be checked for changes in **Parameter 12 - [COS Status Mask]**. The bit definitions for the Status Mask will depend on the drive to which you are connected. Refer to its documentation.

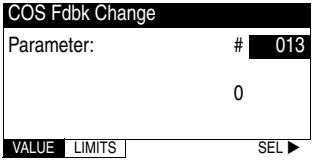
Figure 3.8 COS Status Mask Configuration Screen on PowerFlex 4-Class HIM (22-HIM-*)



Value	Description
0	Ignore this logic bit. (Default)
1	Check this logic bit.

2. Set the amount of change to the Feedback that is required to trigger a Change of State message in **Parameter 13 - [COS Fdbk Change]**.

Figure 3.9 COS Fdbk Change Configuration Screen on PowerFlex 4-Class HIM (22-HIM-*)



The adapter is now configured for COS data exchange. You must configure the scanner to allocate it using COS (Chapter 4, Configuring the Scanner).

Setting a Fault Action

By default, when communications are disrupted (for example, a cable is disconnected) or the scanner is idle, the drive responds by faulting if it is using I/O from the network. You can configure a different response to communication disruptions using **Parameter 07 - [Comm Flt Action]** and a different response to an idle scanner using **Parameter 08 - [Idle Flt Action]**.

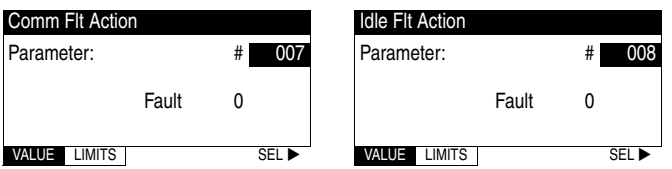
ATTENTION: Risk of injury or equipment damage exists. **Parameters 07 - [Comm Flt Action]** and **08 - [Idle Flt Action]** let you determine the action of the adapter and connected drive if communications are disrupted or the scanner is idle. By default, these parameters fault the drive. You can set these parameters so that the drive continues to run. Precautions should be taken to ensure that the settings of these parameters do not create a hazard of injury or equipment damage.

To change the fault action

- Set the values of **Parameters 07 - [Comm Flt Action]** and **08 - [Idle Flt Action]** to the desired responses:

Value	Action	Description
0	Fault (default)	The drive is faulted and stopped. (Default)
1	Stop	The drive is stopped, but not faulted.
2	Zero Data	The drive is sent 0 for output data after a communications disruption. This does not command a stop.
3	Hold Last	The drive continues in its present state after a communications disruption.
4	Send Fault Cfg	The drive is sent the data that you set in the fault configuration parameters (Parameters 10 - [Flt Config Logic] and 11 - [Flt Config Ref]).

Figure 3.10 Fault Action Screens on PowerFlex 4-Class HIM (22-HIM-*)



Changes to these parameters take effect immediately. A reset is not required.

If Multi-Drive mode is used, the same fault action is used by the adapter for all of the drives it controls (Drive 0 - Drive 4).

To set the fault configuration parameters

If you set **Parameter 07 - [Comm Flt Action]** or **08 - [Idle Flt Action]** to the "Send Flt Cfg," the values in the following parameters are sent to the drive after a communications fault and/or idle fault occurs. You must set these parameters to values required by your application.

Parameter	Name	Description
10	Flt Cfg Logic	A 16-bit value sent to the drive for Logic Command.
11	Flt Cfg Ref	A 16-bit value (0 – 65535) sent to the drive as a Reference.

Changes to these parameters take effect immediately. A reset is not required.

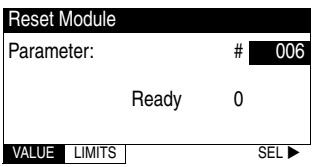
Resetting the Adapter

Changes to switch settings on some adapter parameters require that you reset the adapter before the new settings take effect. You can reset the adapter by cycling power to the drive or by using the following parameter:

ATTENTION: Risk of injury or equipment damage exists. If the adapter is transmitting control I/O to the drive, the drive may fault when you reset the adapter. Determine how your drive will respond before resetting a connected adapter.

- Set the **Parameter 06 - [Reset Module]** to **Reset Module**:

Figure 3.11 Reset Screen on PowerFlex 4-Class HIM (22-HIM-*)



Value	Description
0	Ready (Default)
1	Reset Module
2	Set Defaults

When you enter **1 = Reset Module**, the adapter will be immediately reset. When you enter **2 = Set Defaults**, the adapter will set all adapter parameters to their factory-default settings. The value of this parameter will be restored to **0 = Ready** after the adapter is reset.

Viewing the Adapter Configuration

The following parameters provide information about how the adapter is configured. You can view these parameters at any time.

Number	Name	Description
01	Mode	The mode in which the adapter is set (0 = Single drive operation, or 2 = Multi-Drive operation).
03	DN Addr Actual	The node address used by the adapter. This will be one of the following values: • The address set by the adapter DIP switches 1 through 6. • The value of Parameter 02 - [DN Addr Config] if the switches have been disabled. • An old address of the switches or parameter if they have been changed and the adapter has not been reset.
05	DN Rate Actual	The data rate used by the adapter. This will be one of the following values: • The data rate set by the adapter DIP switches 7 and 8. • The value of Parameter 04 - [DN Rate Config] if the switches have been disabled. • An old data rate of the switches or parameter if they have been changed and the adapter has not been reset.
09	DN Active Config	The source from which the adapter node address and data rate are taken. This will be either switches or parameters in EEPROM. It is determined by the settings of the adapter DIP switches 1 through 8.
16	DSI I/O Actual	Indicating the Drives that make up the node: Values 0 = Drive 0 1 = Drives 0-1 2 = Drives 0-2 3 = Drives 0-3 4 = Drives 0-4

Configuring the Scanner

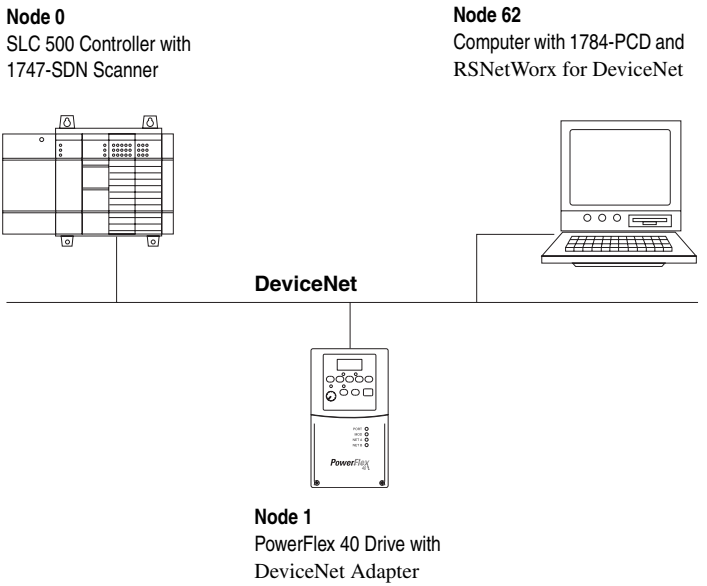
Chapter 4 provides instructions on how to configure a scanner to communicate with the adapter and connected PowerFlex drive.

Topic	Page
Example Network	4-1
Setting Up the Scan List	4-2
Mapping the Drive Data in the Scanner	4-5
Saving the Configuration	4-7

Example Network

After the adapter is configured, the connected drive and adapter will be a single node on the network. This chapter provides the steps that are needed to configure a simple network like the network in Figure 4.1. In our example, we will configure the drive for using Logic Command/ Status and Reference Feedback over the network.

Figure 4.1 Example DeviceNet Network

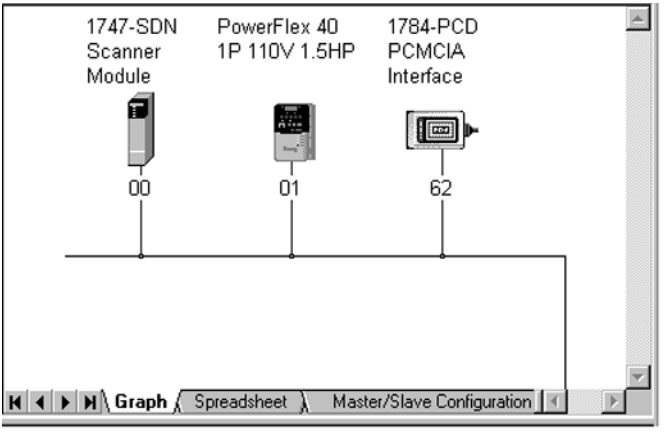


Setting Up the Scan List

For the scanner to communicate with a drive, the scanner must be configured and the drive's node number must be added to its scan list.

1. Go online with RSNetWorx for DeviceNet. Refer to the Using RSNetWorx for DeviceNet section in Chapter 3. The devices on the network are displayed in the configuration view.

Figure 4.2 Configuration View (Graph)



2. Right-click the DeviceNet scanner (node 00 in Figure 4.2) and select **Properties**. The Scanner Module dialog box appears.

   Important: If your scanner is an unrecognized device, you must create an EDS file for it and then configure it. Create an EDS file by following the instructions in the Using RSNetWorx for DeviceNet section in Chapter 3. Configure the scanner using the General and Module tabs. Click **Help** or refer to your scanner documentation if you need more information.

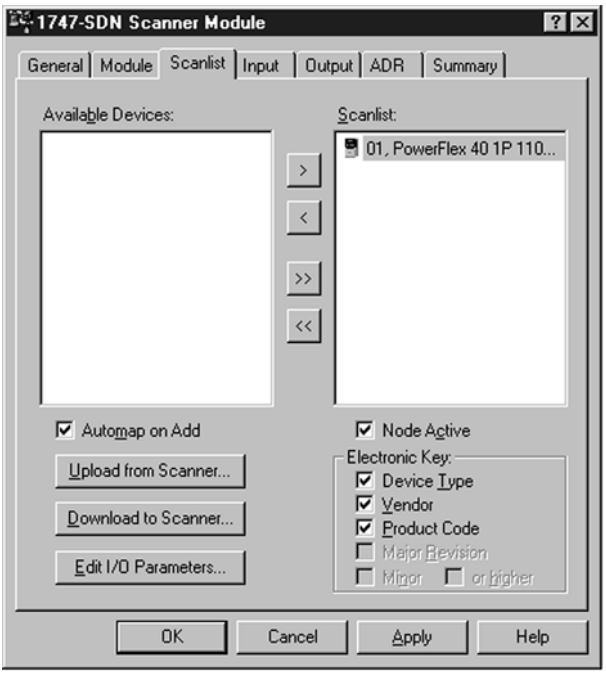
3. Click the **Scanlist** tab. A message box prompts you to upload.

4. Click **Upload**. Data is uploaded from the scanner, and then the Scanlist page (Figure 4.3) appears.

5. Select the **Automap on Add** box (a check mark will appear).

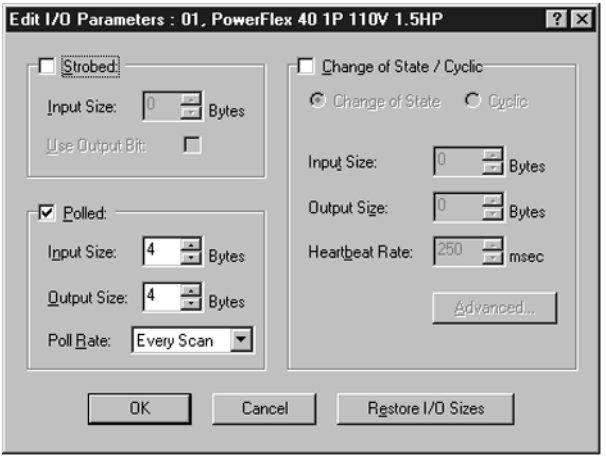
6. Under Available Devices, select the drive, and then click **>** (Right Arrow) to add it to the scanlist.

Figure 4.3 Scanlist Page in the Scanner Module Dialog Box



7. Under Scanlist, select the drive, and then click **Edit I/O Parameters**. The Edit I/O Parameters dialog box (Figure 4.4) appears.

Figure 4.4 Edit I/O Parameters Dialog Box



8. Select the type(s) of data exchange (Polled, Change of State, and /or Cyclic). In our example, we selected Polled.

9. Type the number of bytes that are required for your I/O in the Input Size and Output Size boxes. The size will depend on the I/O that you enabled in the adapter. This information can be found in **Parameter 16 - [DSI I/O Actual]** in the adapter. Table 4.A shows common configuration Input/Output sizes.

In our example, we typed 4 in the Input Size and Output Size boxes because the Mode Jumper on the adapter is set to "Single" (default) and **Parameter 16 - [DSI I/O Active]** is set to "Drive 0" (only one drive being connected). Logic Command/Reference uses 4 bytes and Logic Status/Feedback uses 4 bytes.

Table 4.A Input/Output Size Configurations

Input Size	Output Size	Logic Command/ Status	Reference/ Feedback	Parameter 16 - [DSI I/O Active]	Parameter 1 - [Mode]
4	4	✔	✔	Drive 0	Single
8	8	✔	✔	Drives 0-1	Multi-Drive
12	12	✔	✔	Drives 0-2	
16	16	✔	✔	Drives 0-3	
20	20	✔	✔	Drives 0-4	

10. Set the scan rate.

Data Exchange	Rate to set
Polled	Polled Rate
Change of State	Heartbeat Rate
Cyclic	Send Rate

11. Click **OK**. If you changed any settings, a Scanner Applet asks if it is OK to unmap the I/O. Click **Yes** to continue. The Edit I/O Parameters dialog box closes and then the Scanner Module dialog box (Figure 4.3) re-appears. You will map the I/O in the next section in this chapter.

Mapping the Drive Data in the Scanner

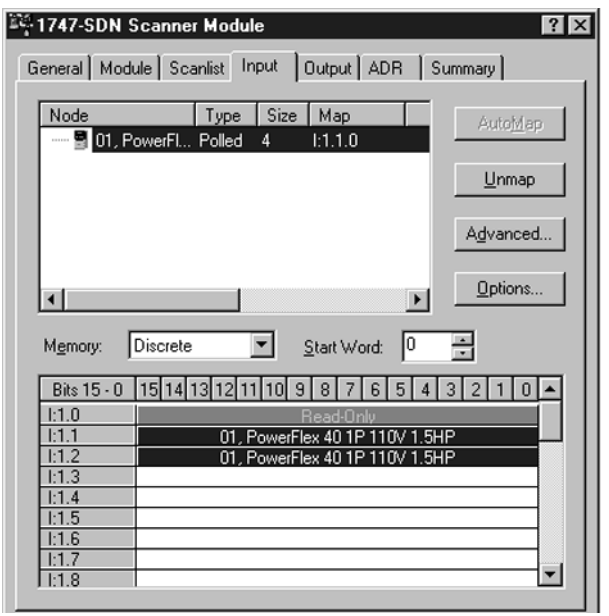
Data from I/O messages must be mapped in the scanner. This mapping determines where a ladder logic program can find data that is passed over the network. You must map both the Input I/O and the Output I/O.

For:	Refer to:
Mapping the Input I/O	4-5
Mapping the Output I/O	4-6

Mapping the Input I/O

1. In the Scanner Module dialog box, click the **Input** tab. (If necessary, right-click the scanner in the configuration view (Figure 4.2) to display this dialog box.)

Figure 4.5 Input Page on the Scanner Module Dialog Box



If you selected the **Automap on Add** box in the Scanlist page (Figure 4.3), RSNetWorx has already mapped the I/O. If it is not mapped, click **Automap** to map it. If you need to change the mapping, click **Advanced** and change the settings.

2. In the Memory box, select a location in scanner memory.

Scanner	Memory Locations
1747-SDN	Discrete or M-File
1756-DNB	Assembly Data
1771-SDN	Block Xfer 62 – 57

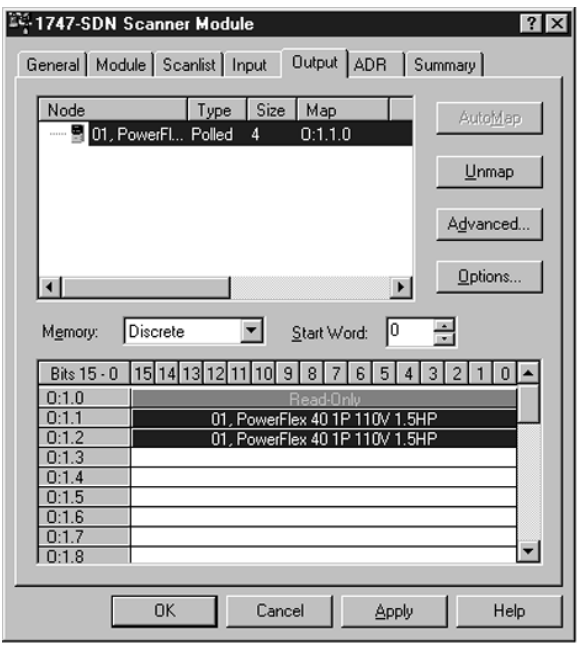
In our example, we are using a 1747-SDN and selected Discrete.

3. In the Start Word box, select the word in memory at which the data should start. In our example, Logic Status and Speed Feedback information will be found in I:1.1 and I:1.2, respectively.

Mapping the Output I/O

1. In the Scanner Module dialog box, click the **Output** tab. To display this dialog box, right-click the scanner in the configuration view (Figure 4.2).

Figure 4.6 Output Page on the Scanner Module Dialog Box



If you selected the **Automap on Add** box in the Scanlist page (Figure 4.3), RSNetWorx has already mapped the I/O. If it is not mapped, click **Automap** to map it. If you need to change the mapping, click **Advanced** and change the settings.

2. In the Memory box, select a location in scanner memory.

Scanner	Memory Locations
1747-SDN	Discrete or M-File
1756-DNB	Assembly Data
1771-SDN	Block Xfer 62 – 57

   In our example, we are using a 1747-SDN and selected Discrete.

3. In the Start Word box, select the word in memory at which the data should start. In our example, Logic Command and Speed Reference data will be written to O:1.1 and O:1.2, respectively.

Saving the Configuration

After configuring a scanner, you must download it to the scanner. You should also save it to a file on your computer.

1. In the Scanner Module dialog box (Figure 4.6), click **Apply** to save the configuration to the scanner. A Scanner Configuration Applet appears and asks if it is OK to download the changes.

2. Click **Yes** to download the changes. The changes are downloaded and then the Scanner Module dialog box reappears.

3. Click **OK** to close the Scanner Module dialog box.

4. Select **File > Save**. If this is the first time that you saved the project, the Save As dialog box appears. Navigate to a folder, type a file name, and click **Save** to save the configuration to a file.

Using I/O Messaging

Chapter 5 provides information and examples that explain how to use I/O Messaging to control a PowerFlex 40 drive.

Topic	Page
About I/O Messaging	5-1
Understanding the I/O Image	5-2
Using Logic Command/Status	5-2
Using Reference/Feedback	5-3

Topic	Page
Example Ladder Logic Programs	5-3
ControlLogix Example	5-4
PLC-5 Example	5-7
SLC Example	5-9

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About I/O Messaging

On DeviceNet, I/O Messaging is used to transfer the data which controls the PowerFlex drive and sets its Reference.

The DeviceNet adapter provides many options for configuring and using I/O, including the following:

- The size of I/O can be configured by selecting the number of attached drives (Single or Multi-Drive mode).
- Change of State, Cyclic, or Polled data exchange methods can be used.

Chapter 3, Configuring the Adapter and Chapter 4, Configuring the Scanner discuss how to configure the adapter and scanner on the network for these options. The Glossary defines the different options. This chapter discusses how to use I/O after you have configured the adapter and scanner.

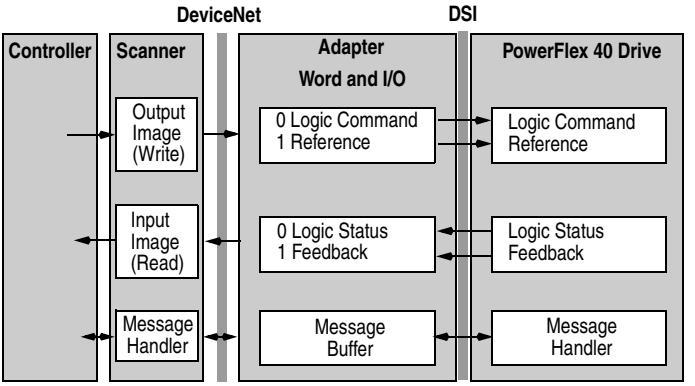
Understanding the I/O Image

The DeviceNet specification requires that the terms *input* and *output* be defined from the scanner's point of view. Therefore, Output I/O is data that is output from the scanner and consumed by the DeviceNet adapter. Input I/O is status data that is produced by the adapter and consumed as input by the scanner. The I/O image table will vary based on the:

- Configuration of the Mode Jumper (J2) on the adapter and **Parameter 15 - [DSI I/O Cfg]**. The image table always uses consecutive words starting at word 0.

Figure 5.1 illustrates an example of a Single drive I/O image (16-bit words).

Figure 5.1 Single Drive Example of I/O Image



Single drive mode is the typical configuration, where one node consists of a PowerFlex 40 drive with a 22-COMM-D adapter.

For Multi-Drive mode, where one node can consist of up to 5 drives, refer to Chapter 7, Using Multi-Drive Mode.

Using Logic Command/Status

When enabled, the Logic Command/Status word is always word 0 in the I/O image. The *Logic Command* is a 16-bit word of control produced by the scanner and consumed by the adapter. The *Logic Status* is a 16-bit word of status produced by the adapter and consumed by the scanner.

This manual contains the bit definitions for compatible products available at the time of publication in Appendix D, Logic Command/Status Words. For other products, refer to their documentation.

Using Reference/Feedback

When enabled, Reference/Feedback begins at word 1 in the I/O image. The *Reference* (16 bits) is produced by the controller and consumed by the adapter. The *Feedback* (16 bits) is produced by the adapter and consumed by the controller.

Size	Valid Values	In I/O Image	Example
16-bit	-32768 to 32767	Word 1	Figure 5.1

Example Ladder Logic Programs

These example ladder logic programs (Figure 5.3 – Figure 5.6) work with PowerFlex 40 drives.

Functions of the Example Programs

The example programs enable an operator to perform the following actions:

- Obtain status information from the drive.
- Use the Logic Command to control the drive (for example, start, stop).
- Send a Reference to the drive.

Adapter Settings for the Example Programs

- Node address 1 is set using the switches.
- The adapter is configured for Single drive mode (mode jumper is set to “Single”).
- Polled I/O was enabled during the scanner configuration.

Scanner Settings for the Example Programs

- The scanner is node 0 on the DeviceNet network.
- The scanner is in slot 1.
- The adapter I/O is mapped in word 0 and word 1.
- Data files, when used, are pointed out in the examples.

Logic Command/Status Words

These examples use the Logic Command word and Logic Status word for PowerFlex 40 drives. Refer to Appendix D, Logic Command/Status Words to view these. The definition of the bits in these words may vary if you are using a different DSI product. Refer to the documentation for your drive.

ControlLogix Example

Figure 5.2 Tags for the Example Program

Tag Name	Type
Local:1:I	DINT[]
Local:1:O	DINT[]
DriveCommandClearFault	BOOL
DriveCommandJog	BOOL
DriveCommandStart	BOOL
DriveCommandStop	BOOL

Tag Name	Type
DriveFeedback	INT
DriveInputImage	INT[2]
DriveOutputImage	INT[2]
DriveReference	INT
DriveStatusFaulted	BOOL
DriveStatusRunning	BOOL

Figure 5.3 Example ControlLogix Ladder Logic Program

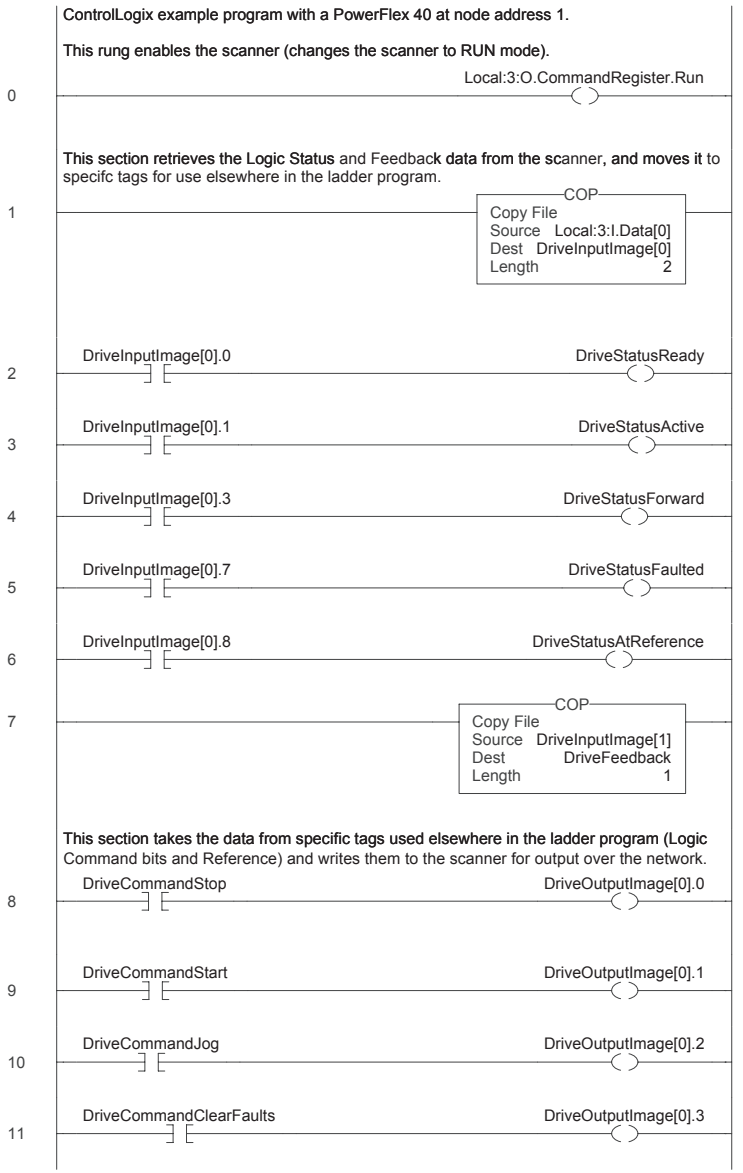
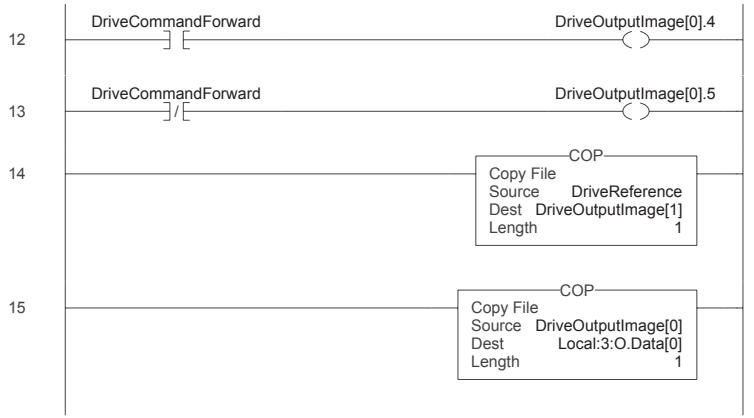


Figure 5.3 Example ControlLogix Ladder Logic Program (Continued)



For the explicit message portion of this ladder example program, see Figure 6.6.

PLC-5 Example

Figure 5.4 Control File for Block Transfers

	EN	ST	DN	ER	CO	EW	NR	TO	RW	RLEN	DLEN	FILE	ELEM	R	G	S
BT20:0	0	0	0	0	0	0	0	0	0	62	0	9	0	00	0	0
BT20:1	0	0	0	0	0	0	0	0	0	62	0	10	0	00	0	0

Figure 5.5 Example PLC-5 Ladder Logic Program

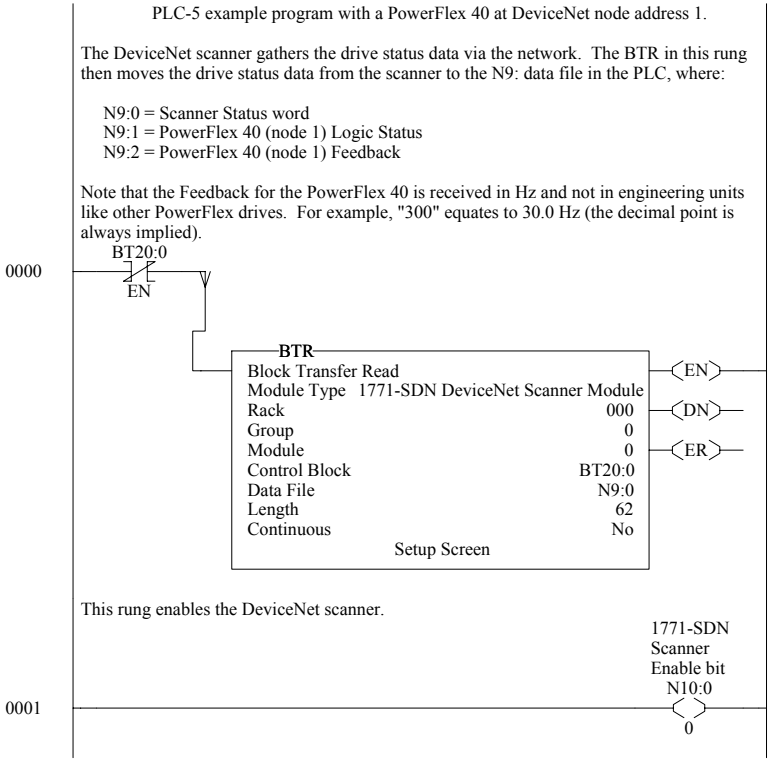
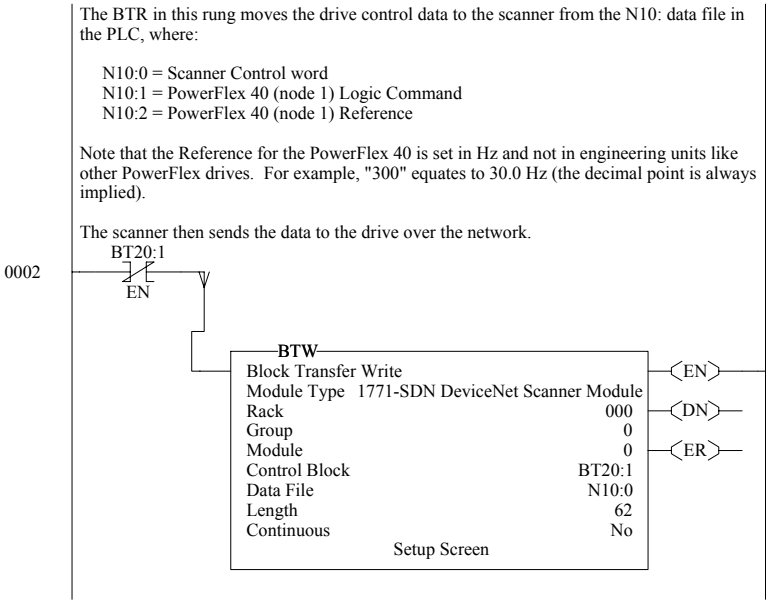

PLC-5 example program with a PowerFlex 40 at DeviceNet node address 1.
The DeviceNet scanner gathers the drive status data via the network. The BTR in this rung then moves the drive status data from the scanner to the N9: data file in the PLC, where:
N9:0 = Scanner Status word
N9:1 = PowerFlex 40 (node 1) Logic Status
N9:2 = PowerFlex 40 (node 1) Feedback
Note that the Feedback for the PowerFlex 40 is received in Hz and not in engineering units like other PowerFlex drives. For example, "300" equates to 30.0 Hz (the decimal point is always implied).
0000
BT20:0
EN
BTR
Block Transfer Read
Module Type 1771-SDN DeviceNet Scanner Module
Rack 000
Group 0
Module 0
Control Block BT20:0
Data File N9:0
Length 62
Continuous No
Setup Screen
EN
DN
ER
This rung enables the DeviceNet scanner.
1771-SDN Scanner Enable bit
N10:0
0
0001

Figure 5.5 Example PLC-5 Ladder Logic Program (Continued)


The BTR in this rung moves the drive control data to the scanner from the N10: data file in the PLC, where:
N10:0 = Scanner Control word
N10:1 = PowerFlex 40 (node 1) Logic Command
N10:2 = PowerFlex 40 (node 1) Reference
Note that the Reference for the PowerFlex 40 is set in Hz and not in engineering units like other PowerFlex drives. For example, "300" equates to 30.0 Hz (the decimal point is always implied).
The scanner then sends the data to the drive over the network.
0002
BT20:1
EN
BTW
Block Transfer Write
Module Type 1771-SDN DeviceNet Scanner Module
Rack 000
Group 0
Module 0
Control Block BT20:1
Data File N10:0
Length 62
Continuous No
Setup Screen
EN
DN
ER

For the explicit message portion of this ladder example program, see Figure 6.7.

SLC Example

Figure 5.6 Example SLC Ladder Logic Program

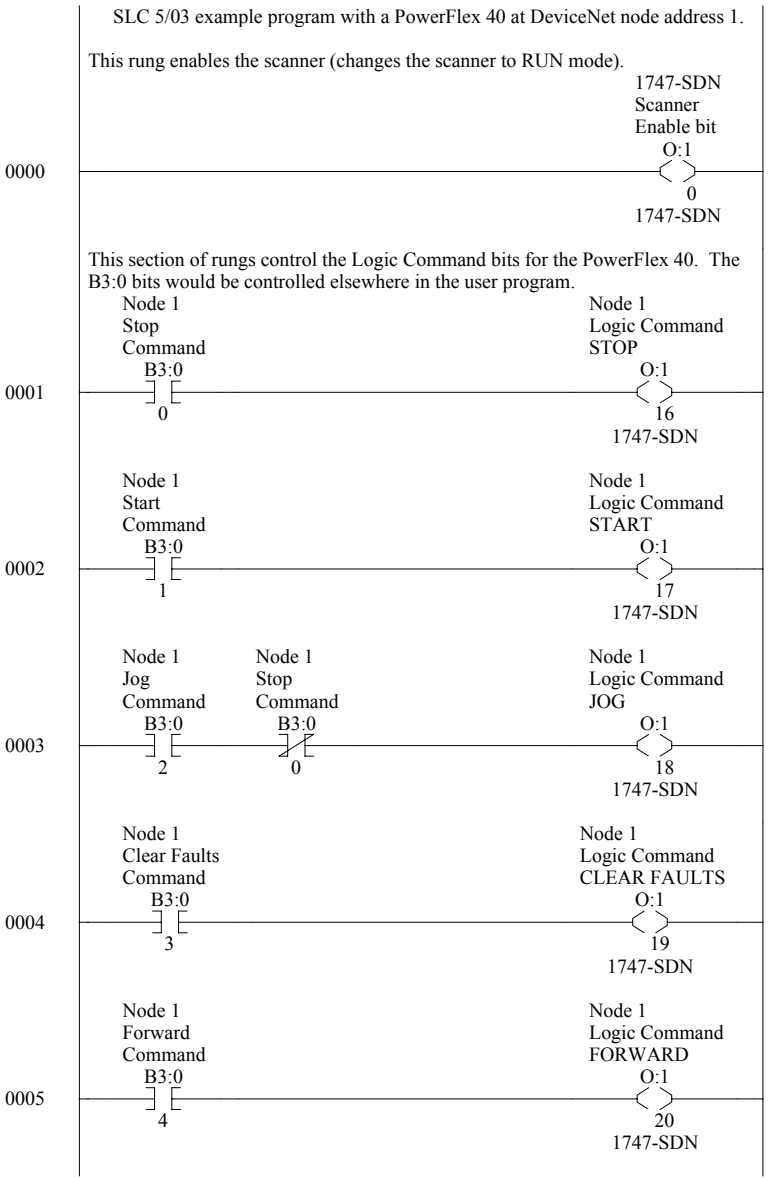


Figure 5.6 Example SLC Ladder Logic Program (Continued)

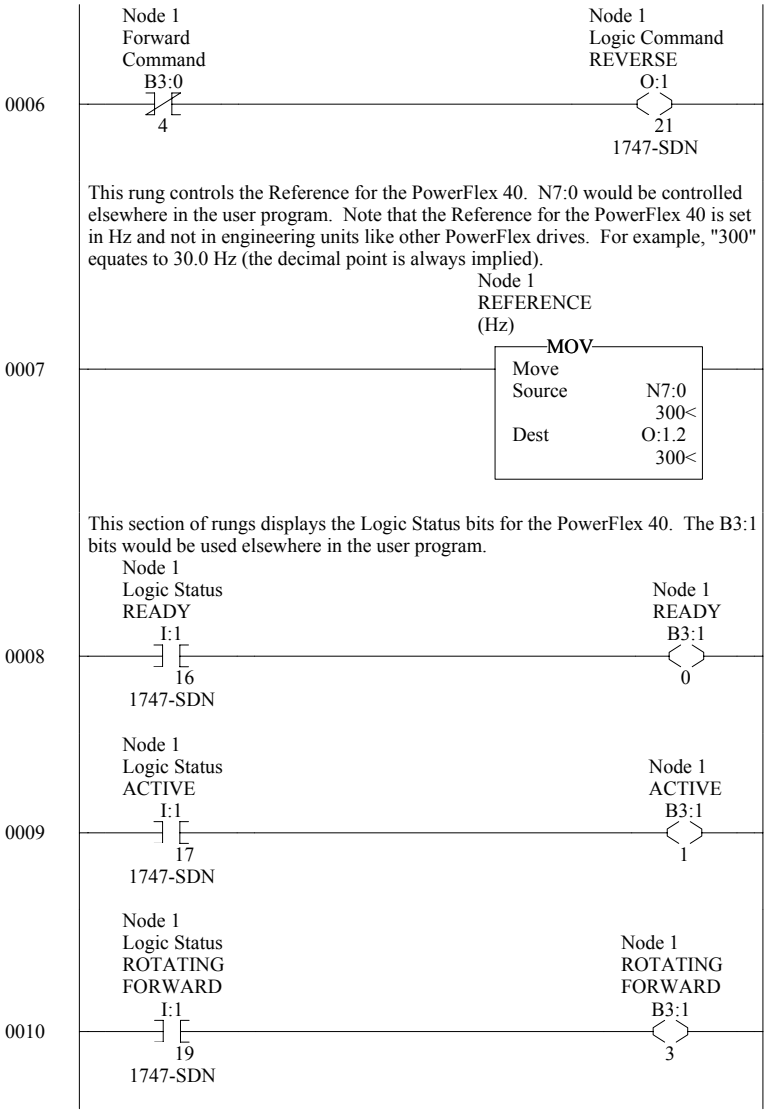
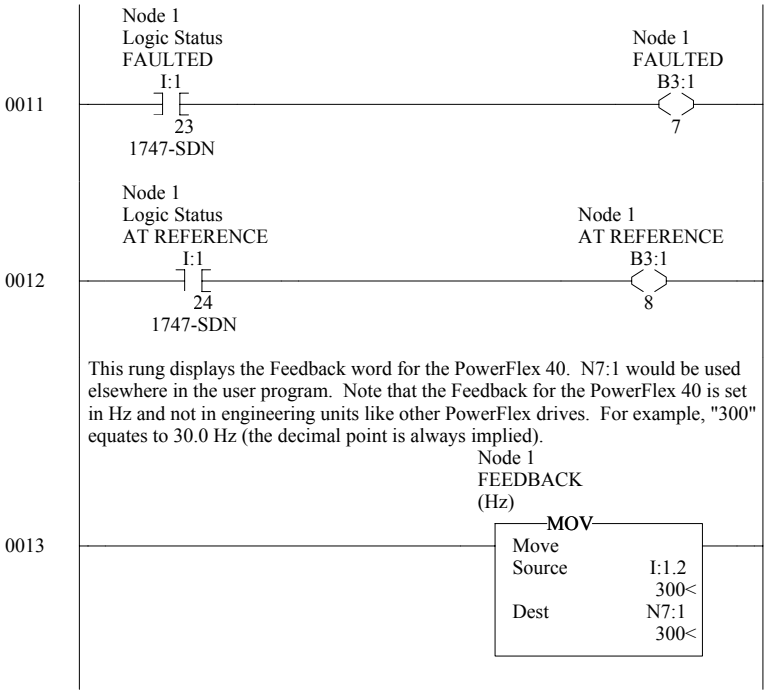


Figure 5.6 Example SLC Ladder Logic Program (Continued)



For the explicit message portion of this ladder example program, see Figure 6.8.

Using Explicit Messaging

Chapter 6 provides information and examples that explain how to use Explicit Messaging to monitor and configure the adapter installed and connected to the PowerFlex 40 drive.

Topic	Page
About Explicit Messaging	6-1
Formatting Explicit Messages	6-2
Running Explicit Messages	6-7

Topic	Page
ControlLogix Example	6-8
PLC-5 Example	6-11
SLC Example	6-13

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ATTENTION: Hazard of equipment damage exists. If Explicit Messages are programmed to write parameter data to Non-Volatile Storage (NVS) frequently, the NVS will quickly exceed its life cycle and cause the drive to malfunction. Do not create a program that frequently uses Explicit Messages to write parameter data to NVS. Datalinks do not write to NVS and should be used for frequently changed parameters.

About Explicit Messaging

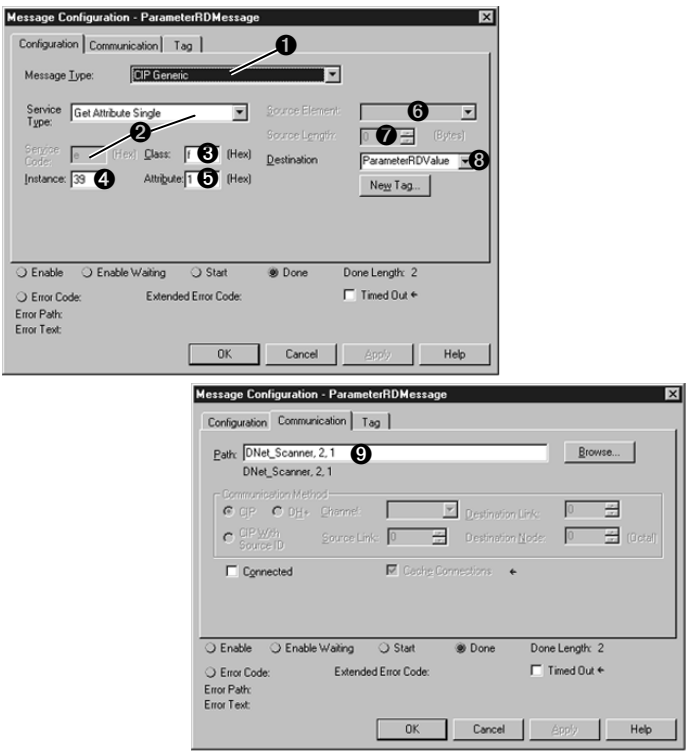
Explicit Messaging is used to transfer data that does not require continuous updates. With Explicit Messaging, you can configure and monitor a slave device's parameters on the DeviceNet network.

Formatting Explicit Messages

Explicit Messages for a ControlLogix Controller

ControlLogix scanners accommodate both downloading Explicit Message Requests and uploading Explicit Message Responses. The scanner module can accommodate one request or response for each transaction block. Each transaction block must be formatted as shown in Figure 6.1.

Figure 6.1 ControlLogix Message Format in RSLogix 5000



Refer to Page 6-3 for a description of the data that is required in each box (1 – 9).

TIP: To display the Message Configuration dialog box in RSLogix 5000, add a message instruction, create a tag for the message (properties: base tag, MESSAGE data type, controller scope), and click the blue box inside the message.

The following table identifies the number of Explicit Messages that can be executed at a time.

Scanner	Messages at One Time	Refer To
1756-DNB	5	Figure 6.1

ControlLogix Message Requests and Responses

Box	Description
❶	**Message Type** The message type must be CIP Generic.
❷	**Service Type/Service Code** The service type/code is the requested DeviceNet service. Available services depend on the class and instance that you are using. Refer to Appendix C, DeviceNet Objects.
❸	**Class** The object type is a DeviceNet class. Refer to Appendix C, DeviceNet Objects, for available classes.
❹	**Instance** The object ID is an instance of a DeviceNet class. Refer to Appendix C, DeviceNet Objects, for available instances.
❺	**Attribute** The attribute is a class or instance attribute. Refer to Appendix C, DeviceNet Objects, for available attributes.
❻	**Source Element** This box contains the name of the tag for any service data to be sent from the scanner to the adapter and drive. A tag must be specified even if it is not used.
❼	**Source Length** This box contains the number of bytes of service data to be sent or received in the message.
❽	**Destination** This box contains the name of the tag that will receive service response data from the adapter and drive. A tag must be specified even if it is not used.
❾	**Path** The path includes the following: • Name of the DeviceNet scanner. • Communication port on the front of the 1756-DNB scanner. Always 2. • Node address of the DeviceNet adapter. This is set with switches or parameters in the DeviceNet adapter. **Tip:** Click **Browse** to find the path or type in the name of a module that you previously mapped.

Explicit Messages for a PLC or SLC Controller

Transaction blocks in PLC and SLC scanners accommodate both downloading Explicit Message Requests and uploading Explicit Message Responses. The scanner module can accommodate one request or response for each transaction block. Each transaction block must be formatted as shown in Figure 6.2 or Figure 6.3.

Figure 6.2 PLC Explicit Message Format

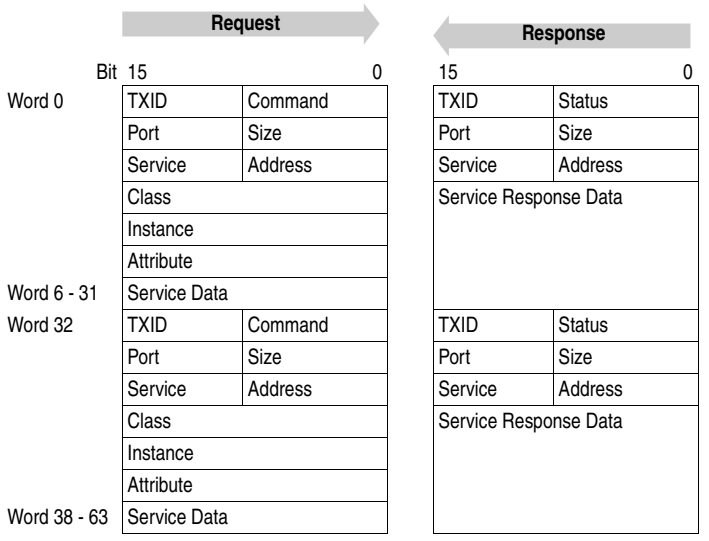
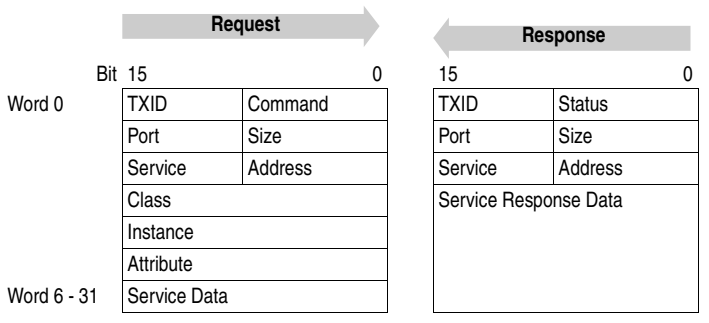


Figure 6.3 SLC Explicit Message Format



Refer to Page 6-5 and Page 6-6 for a description of the data that is required in each word.

The following table identifies the number of transaction blocks within a scanner that are reserved for Explicit Messaging.

Scanner	Number of Transaction Blocks	Words in Each Transaction Block	Refer To
1747-SDN	10	32	Figure 6.3
1771-SDN	10	32 (two blocks can be moved at once)	Figure 6.2

PLC / SLC Explicit Message Requests

Word	Description
0	**Command** (Least Significant Byte) The Command is a code that instructs the scanner how to administer the request during each download. 00 = Ignore transaction block (empty) 01 = Execute this transaction block 02 = Get status of transaction TXID 03 = Reset all client/server transactions 04 = Delete this transaction block (available only for SLC) 05 – 255 = Reserved
	TXID (Most Significant Byte) The Transaction ID is a 1-byte integer between 1 and 255. It is assigned in the ladder logic program when the processor creates and downloads a request to the scanner. The scanner uses it to track the transaction to completion. It returns this value with the response that matches the request downloaded by the processor.
1	**Size** (Least Significant Byte) The size of the service data is in bytes. Service data includes the words for the class, instance, attribute, and any data. The maximum size is 58 bytes (29 words).
	Port (Most Significant Byte) The port that is used by the message is always zero (Channel A) on an SLC scanner. It is zero (Channel A) or one (Channel B) for a PLC scanner.
2	**Address** (Least Significant Byte) The node address of the slave device to which the transaction is sent. For the Explicit Message to be successful, the slave device must be in the scanlist of the scanner, and it must be online.
	Service (Most Significant Byte) Available services depend on the class and instance that you are using. Refer to Appendix C, DeviceNet Objects.
3	**Class** Refer to Appendix C, DeviceNet Objects, for available classes.
4	**Instance** Refer to Appendix C, DeviceNet Objects, for available instances.
5	**Attribute** Refer to Appendix C, DeviceNet Objects, for available attributes.
6 – 31	**Request Data** This is data used for the message. For example, it may be the value written to a parameter.

PLC / SLC Explicit Message Responses

Word	Description
0	**Status** (Least Significant Byte) One of the following status codes is provided during each upload: 00 = Ignore transaction block (empty) 01 = Transaction completed successfully 02 = Transaction in progress (not ready) 03 = Slave not in scan list 04 = Slave offline 05 = DeviceNet port disabled or offline 06 = Transaction TXID unknown 08 = Invalid command code 09 = Scanner out of buffers 10 = Other client/server transaction in progress 11 = Could not connect to slave device 12 = Response data too large for block 13 = Invalid port 14 = Invalid size specified 15 = Connection busy 16 – 255 = Reserved
	TXID (Most Significant Byte) The transaction ID is a 1-byte integer in word 31 with a range of 1 to 255. It is assigned in the ladder logic program when the processor creates and downloads a request to the scanner. The scanner uses it to track the transaction to completion. It returns this value with the response that matches the request downloaded by the processor.
1	**Size** (Least Significant Byte) The size of the service data is in bytes. The service data includes words used for the response data. The maximum size is 58 bytes (29 words).
	Port (Most Significant Byte) The port that is used by the message is always zero (Channel A) on an SLC scanner. It is zero (Channel A) or one (Channel B) for a PLC scanner.
2	**Address** (Least Significant Byte) The node address of the slave device to which the transaction is sent. For the Explicit Message to be successful, the slave device must be in the scanlist of the scanner, and it must be online.
	Service (Most Significant Byte) If the message was successful, 0x80 is added to the service. If it is unsuccessful, 0x94 is returned.
3 – 31	**Response Data** This is data used for the message. For example, it may be the value read from a parameter.

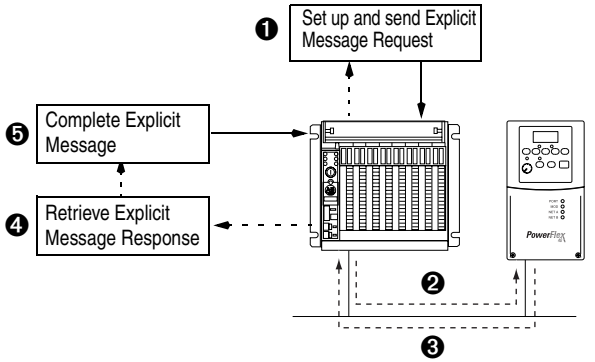
Refer to Page 6-5 for a description of the words in a PLC/SLC Explicit Message request.

Running Explicit Messages

There are five basic events in the Explicit Messaging process. The details of each step will vary depending on the controller (ControlLogix, PLC, or SLC). Refer to the documentation for your controller.

Important: There must be a request message and an response message for all Explicit Messages, whether you are reading or writing data.

Figure 6.4 Explicit Message Process



1. You format the required data and set up the ladder logic program to send an Explicit Message request to the scanner module (download).

2. The scanner module transmits the Explicit Message Request to the slave device over the DeviceNet network.

3. The slave device transmits the Explicit Message Response back to the scanner. The data is stored in the scanner buffer.

4. The controller retrieves the Explicit Message Response from the scanner's buffer (upload).

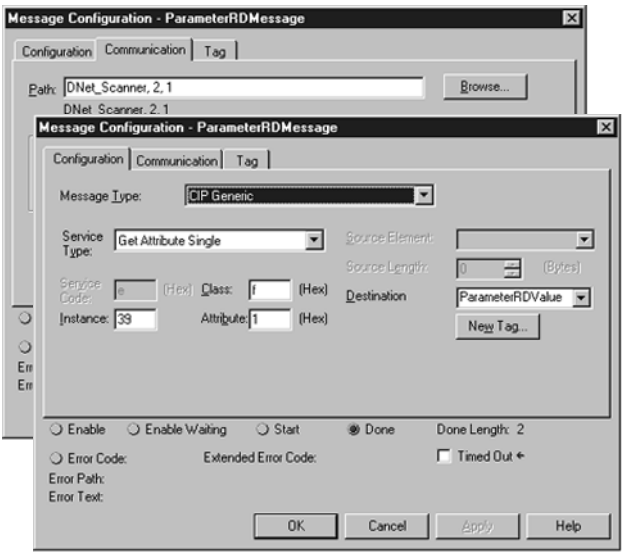
5. The Explicit Message is complete. If you are using a PLC or SLC, delete the transaction ID so that it can be reused.

ControlLogix Example

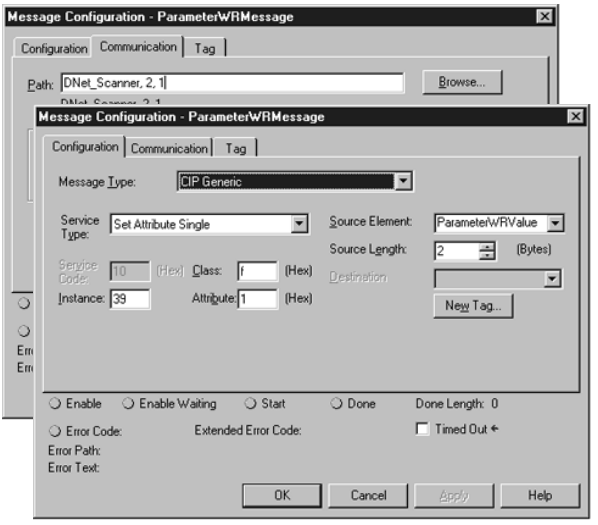
Data Format for a Read and Write Parameter

The data in this example is for a PowerFlex drive at node address 1.

Refer to Formatting Explicit Messages in this chapter for a description of the content in each box.



Configuration	Example Value	Description	Refer to . . .
Service Code	e (hex)	Get_Attribute_Single	C-10
Object Type	f (hex)	Parameter Object	C-8
Object ID	39 (dec)	Parameter Address	
Object Attribute	1 (hex)	Parameter Value	C-9



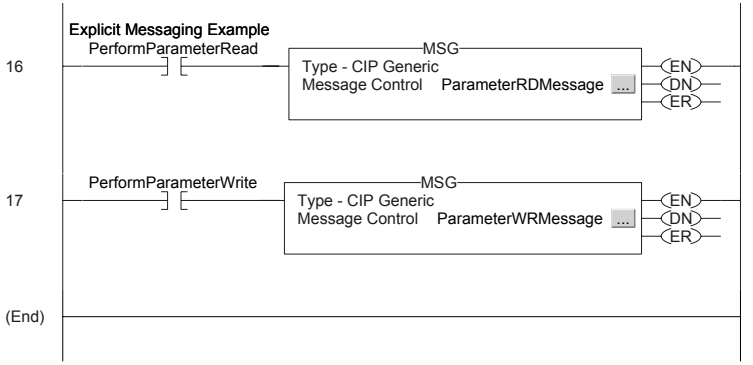
Configuration	Example Value	Description	Refer to . . .
Service Code	10 (hex)	Set_Attribute_Single	C-10
Object Type	f (hex)	Parameter Object	C-8
Object ID	39 (dec)	Parameter Address	
Object Attribute	1 (hex)	Parameter Value	C-9

Figure 6.5 Tags for the Example Explicit Messaging Program

Tag Names for Read Message	Type
PerformParameterRead	BOOL
ParameterRDMessage	MESSAGE
ParameterRDValue	INT

Tag Names for Write Messages	Type
PerformParameterWrite	BOOL
ParameterWRMessage	MESSAGE
ParameterWRVaule	INT

Figure 6.6 Example ControlLogix Ladder Logic Program



For the I/O message portion of this ladder example program, see Figure 5.3.

PLC-5 Example

Data Format for a Read and Write Parameter

The data in this example is for a PowerFlex drive at node address 1.

Refer to Formatting Explicit Messages in this chapter for a description of the content of the data file.

Request Data for Read of Drive Parameter 39

Address	Value (hex)	Description	Refer to . . .
N11:0	0101	TXID = 01, Command = 01 (execute)	6-5
N11:1	0006	Port = 00, Size = 06 bytes	6-5
N11:2	0E01	Service = 0E (Get_Attribute_Single)	C-10
		Address = 01 (Node Address)	6-5
N11:3	000F	Class = 0F (Parameter Object)	C-8
N11:4	0027	Instance = Parameter 39 (27 hex)	
N11:5	0001	Attribute = 01 (Parameter Value)	C-9

Response Data for Read of Drive Parameter 39

Address	Value (hex)	Description	Refer to . . .
N11:100	0101	TXID = 01, Status = 01 (successful)	6-6
N11:101	0002	Port = 00, Size = 02 bytes	6-6
N11:102	8E01	Service = 8E (successful), Address = 01 (Node Address)	6-6
N11:103	0064	Response Data = 100 (64 hex) = 10.0 seconds	

Request Data for Write to Drive Parameter 101

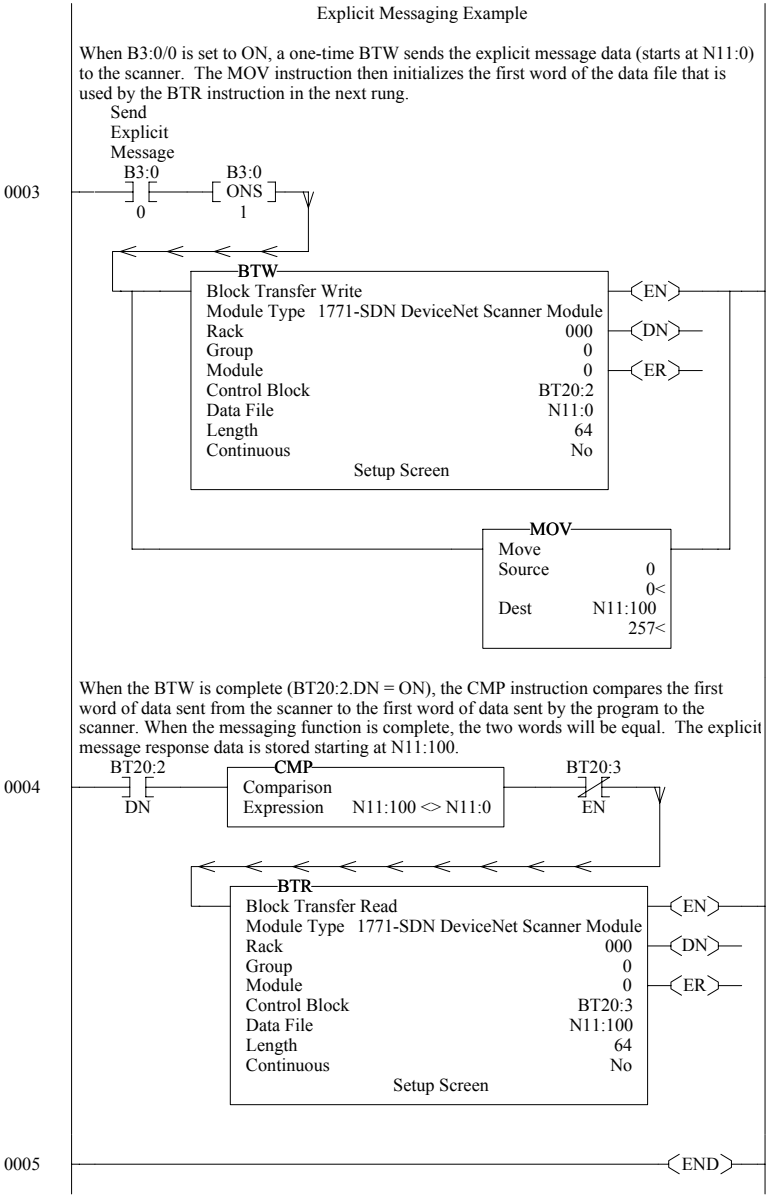
Address	Value (hex)	Description	Refer to . . .
N11:0	0101	TXID = 01, Command = 01 (execute)	6-5
N11:1	0008	Port = 00, Size = 08 bytes	6-5
N11:2	1001	Service = 10 (Set_Attribute_Single)	C-10
		Address = 01 (Node Address)	6-5
N11:3	000F	Class = 0F (Parameter Object)	C-8
N11:4	0027	Instance = Parameter 39 (27 hex)	
N11:5	0001	Attribute = 01 (Parameter Value)	C-9
N11:6	0064	Data = 100 (64 hex) = 10.0 seconds	

Response Data for Write to Drive Parameter 101

Address	Value (hex)	Description	Refer to . . .
N11:100	0101	TXID = 01, Status = 01 (successful transaction)	6-6
N11:101	0000	Port = 00, Size = 00 bytes	6-6
N11:102	9001	Service = 90 (successful) Address = 01 (Node Address)	6-6

Ladder Logic Program

Figure 6.7 Example PLC-5 Ladder Logic Program



For the I/O message portion of this ladder example program, see Figure 5.5.

SLC Example

Data Format for a Read and Write Parameter

The data in this example is for a PowerFlex drive at node address 1.

Refer to Formatting Explicit Messages in this chapter for a description of the content of the data file.

Request Data for Read of Drive Parameter 101

Address	Value (hex)	Description	Refer to . . .
N9:10	0101	TXID = 01, Command = 01 (execute)	6-5
N9:11	0006	Port = 00, Size = 06 bytes	6-5
N9:12	0E01	Service = 0E (Get_Attribute_Single)	C-10
		Address = 01 (Node Address)	6-5
N9:13	000F	Class = 0F (Parameter Object)	C-8
N9:14	0027	Instance = Parameter 39 (27 hex)	
N9:15	0001	Attribute = 01 (Parameter Value)	C-9

Response Data for Read of Drive Parameter 101

Address	Value (hex)	Description	Refer to . . .
N9:50	0101	TXID = 01, Status = 01 (successful)	6-6
N9:51	0002	Port = 00, Size = 02 bytes	6-6
N9:52	8E01	Service = 8E (successful) Address = 01 (Node Address)	6-6
N9:53	0064	Response Data = 100 (64 hex) = 10.0 seconds	

Request Data for Write to Drive Parameter 101

Address	Value (hex)	Description	Refer to . . .
N9:10	0101	TXID = 01, Command = 01 (execute)	6-5
N9:11	0008	Port = 00, Size = 08 bytes	6-5
N9:12	1001	Service = 10 (Set_Attribute_Single)	C-10
		Address = 01 (Node Address)	6-5
N9:13	000F	Class = 0F (Parameter Object)	C-8
N9:14	0027	Instance = Parameter 39 (27 hex)	
N9:15	0001	Attribute = 01 (Parameter Value)	C-9
N9:16	0064	Data =100 (64 hex) = 10.0 seconds	

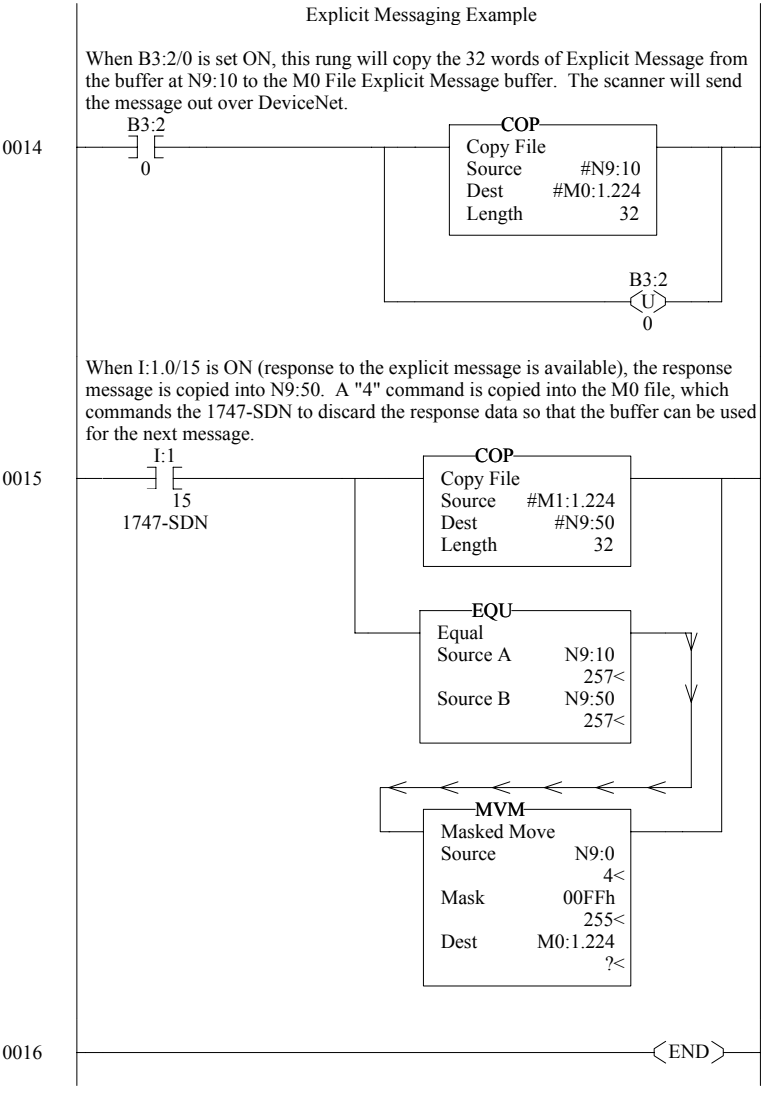
Response Data for Write to Drive Parameter 101

Address	Value (hex)	Description	Refer to . . .
N9:50	0101	TXID = 01, Status = 01 (successful transaction)	6-6
N9:51	0000	Port = 00, Size = 00 bytes	6-6
N9:52	9001	Service = 90 (successful) Address = 01 (Node Address)	6-6

Program

Important: To originate a scanner transaction, use a copy operation to M0:[slot number]:224. Then, use a copy operation to read M1:1.224 for the result. If more than one message is enabled, use the TXID to determine which message you are reading.

Figure 6.8 Example SLC Ladder Logic Program



For the I/O message portion of this ladder example program, see Figure 5.6.

Notes:

Using Multi-Drive Mode

Chapter 7 provides information and a ControlLogix ladder example to explain how to use Multi-Drive mode.

Topic	Page
Single Mode vs. Multi-Drive Mode	7-1
System Wiring	7-3
Understanding the I/O Image	7-4
Configuring the RS-485 Network	7-5

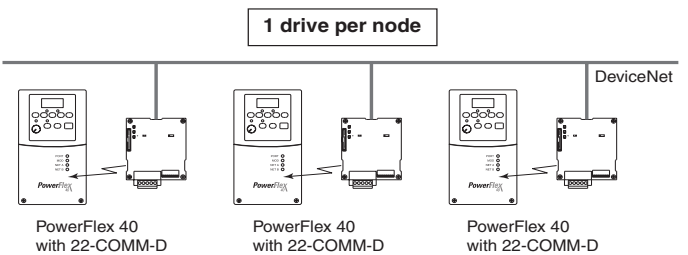
Topic	Page
Multi-Drive Ladder Logic Program Example	7-6
ControlLogix Example	7-7
Multi-Drive Mode Explicit Messaging	7-20
Additional Information	7-22

ATTENTION: Hazard of injury or equipment damage exists. The examples in this publication are intended solely for purposes of example. There are many variables and requirements with any application. Rockwell Automation, Inc. does not assume responsibility or liability (to include intellectual property liability) for actual use of the examples shown in this publication.

Single Mode vs. Multi-Drive Mode

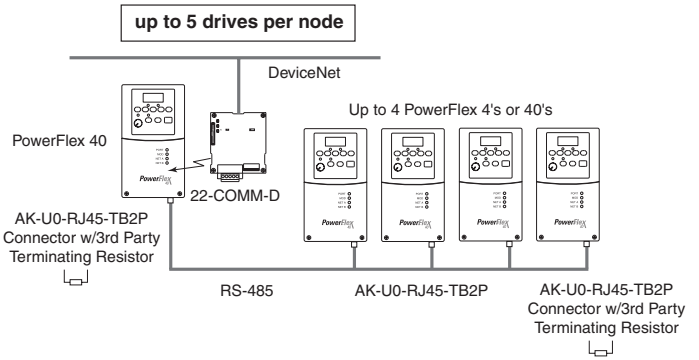
Single mode is a typical network installation, where a single DeviceNet node consists of a single drive with a 22-COMM-D adapter (Figure 7.1).

Figure 7.1 Single Mode Example for Network



Multi-Drive mode is an alternative to the typical network installation, where a single DeviceNet node can consist of one to five drives (Figure 7.2). The first drive must be a PowerFlex 40 with a 22-COMM-D adapter. The remaining drives can be PowerFlex 4 or 40 drives and they are daisy-chained over RS-485 with the first drive.

Figure 7.2 Multi-Drive Mode Example for Network



Benefits of Multi-Drive mode include:

- Lower hardware costs. Only one 22-COMM-D adapter is needed for up to five drives. PowerFlex 4's can also be used for the daisy-chained drives instead of PowerFlex 40's.
- Reduces the network node count (DeviceNet is 63 nodes maximum). For example, in Single mode 30 drives would consume 30 nodes. In Multi-Drive mode, 30 drives can be connected in 6 nodes.
- Provides a means to put PowerFlex 4's on DeviceNet (PowerFlex 4's do not have an internal communications adapter slot).
- Controller can control, monitor, and read/write parameters for all five drives.

The trade-offs of Multi-Drive mode include:

- If the PowerFlex 40 with the 22-COMM-D adapter is powered down, then communications with the daisy-chained drives are disrupted and the drives will take the appropriate communications loss action set in each drive.
- Communications throughput to the daisy-chained drives will be slower than if each drive was a separate node on DeviceNet (Single mode). This is because the 22-COMM-D adapter must take the DeviceNet data for the other drives and sequentially send the respective data to each drive over RS-485. The approximate additional throughput time for Logic Command/Reference to be transmitted and received by each drive is:

Drive	Additional Throughput Time versus Single Mode
PowerFlex 40 w/22-COMM-D	0 ms
PowerFlex 40 w/22-COMM-D plus 1 drive	+24 ms
PowerFlex 40 w/22-COMM-D plus 2 drives	+48 ms
PowerFlex 40 w/22-COMM-D plus 3 drives	+72 ms
PowerFlex 40 w/22-COMM-D plus 4 drives	+96 ms

- Automatic Device Replacement (ADR) cannot be used with any of the drives.
- The RSNetWorx Parameter editor cannot be used.
- Since the RS-485 ports are used for daisy-chaining the drives, there is no connection for a peripheral device such as a HIM. The AK-U0-RJ45-SC1 DSI Splitter cable cannot be used to add a second connection for a peripheral device.

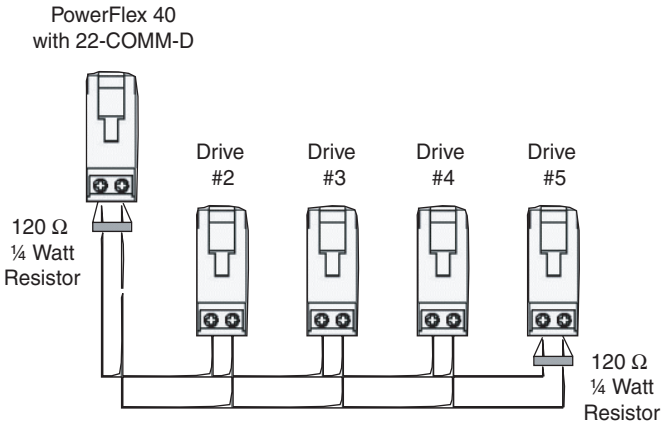
System Wiring

To daisy-chain the drives off the PowerFlex 40 with the 22-COMM-D adapter (Drive 0), the AK-U0-RJ45-TB2P terminal block connector (Figure 7.3) can be used for easy installation.

Figure 7.3 AK-U0-RJ45-TB2P Terminal Block Connector

The wiring diagram for using AK-U0-RJ45-TB2P terminal block connectors is shown in Figure 7.4.

Figure 7.4 AK-U0-RJ45-TB2P Connector Wiring Diagram



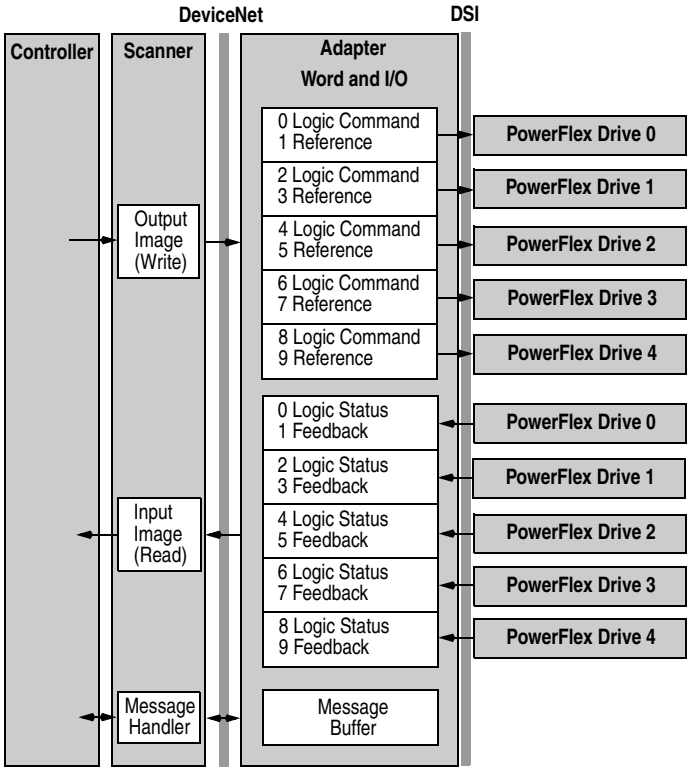
Understanding the I/O Image

The DeviceNet specification requires that the terms *input* and *output* be defined from the scanner's point of view. Therefore, Output I/O is data that is output from the scanner and consumed by the DeviceNet adapter. Input I/O is status data that is produced by the adapter and consumed as input by the scanner. The I/O image table will vary based on the:

- Configuration of the Mode Jumper (J2) on the adapter and **Parameter 15 - [DSI I/O Cfg]**. The image table always uses consecutive words starting at word 0.

Figure 7.5 illustrates the Multi-Drive I/O image with 16-bit words.

Figure 7.5 Multi-Drive Example of I/O Image



Configuring the RS-485 Network

The following parameters must be set in the daisy-chained drives:

Parameter	Value
P36 - [Start Source]	5 (“RS485 [DSI] Port”)
P38 - [Speed Reference]	5 (“RS485 [DSI] Port”)
A103 - [Comm Data Rate]	4 (“19.2K”)
A104 - [Comm Node Addr]	1-247 (must be unique)
A107 - [Comm Format]	0 (“RTU 8-N-1”)

Note that the RS-485 network is fixed at 19.2K baud, 8 data bits, no parity, and 1 stop bit.

Important: **Parameters A105 - [Comm Loss Action]** and **A106 - [Comm Loss Time]** in the daisy-chained drives are not used in Multi-Drive mode. If the RS-485 cable is disconnected or broken, the disconnected drive(s) will fault. On the DeviceNet side, **Parameters 07 - [Comm Flt Action]** and **08 - [Idle Flt Action]** in the 22-COMM-D determine the action taken for ALL of the drives on the Multi-Drive node.

The following Multi-Drive parameters must be set in the 22-COMM-D:

Parameter	Value
15 - [DSI I/O Cfg]	00010 = Drives 0-1 connected 00100 = Drives 0-2 connected 01000 = Drives 0-3 connected 10000 = Drives 0-4 connected
17 - [Drv 0 Addr]	= Parameter A104 - [Comm Node Address] in Drive 0
18 - [Drv 1 Addr]	= Parameter A104 - [Comm Node Address] in Drive 1
19 - [Drv 2 Addr]	= Parameter A104 - [Comm Node Address] in Drive 2
20 - [Drv 3 Addr]	= Parameter A104 - [Comm Node Address] in Drive 3
21 - [Drv 4 Addr]	= Parameter A104 - [Comm Node Address] in Drive 4

After setting the 22-COMM-D parameters, set the adapter Mode Jumper from Single drive operation to Multi-Drive operation, and reset the adapter or cycle power. Refer to Chapter 2, Commissioning the Adapter.

Important: 22-COMM-D parameters can be set using a DSI peripheral (HIM, DriveExplorer with 22-SCM-232, etc.) ONLY when the Mode Jumper is in the Single mode position.

Multi-Drive Ladder Logic Program Example

The example ladder logic program demonstrates using Multi-Drive mode with five drives. See Figure 7.2 for a system layout diagram.

Function of the Example Program

The example program provided is for the ControlLogix, but other controllers can also be used. The following actions can be performed:

- View status information from the drives such as Ready, Fault, At Speed, and Feedback.
- Control the drives using various Logic Command bits (Stop, Start, etc.) and Reference.
- Perform a single parameter read and write for each drive. The example uses drive **Parameter 39 - [Accel Time]** for both so you can see (read) the change after a write is performed.

Adapter Settings for the Example Program

- The Mode Jumper on the adapter is set to the Multi-Drive operation position. See Chapter 2, Commissioning the Adapter.
- All DIP switches on the adapter are set to CLOSED (all 0's). See Chapter 2, Commissioning the Adapter. The actual node address will be set via a software parameter.
- The following adapter parameters are set:

Parameter	Value	Description
02 - [DN Addr Cfg]	1	DeviceNet node address
15 - [DSI I/O Cfg]	4	"Drives 0-4" — 5 drives on 1 node
17 - [Drv 0 Addr](1)	1	Modbus address of Drive 0
18 - [Drv 1 Addr]	2	Modbus address of Drive 1
19 - [Drv 2 Addr]	3	Modbus address of Drive 2
20 - [Drv 3 Addr]	4	Modbus address of Drive 3
21 - [Drv 4 Addr]	5	Modbus address of Drive 4

(1) The settings for these parameters must match the Parameter A104 - [Comm Node Addr] settings in the respective drives.

Drive Settings for the Example Program

Parameter	Value				
	Drive 0	Drive 1	Drive 2	Drive 3	Drive 4
P36 - [Start Source]	5	5	5	5	5
P38 - [Speed Reference]	5	5	5	5	5
A103 - [Comm Data Rate]	4	4	4	4	4
A104 - [Comm Node Addr](1)	1	2	3	4	5
A105 - [Comm Loss Action]	0	0	0	0	0
A106 - [Comm Loss Time]	5	5	5	5	5
A107 - [Comm Format]	0	0	0	0	0

(1) The settings for these parameters must match the respective parameter settings in the adapter (Parameter 17 - [Drive 0 Address] through Parameter 21 - [Drive 4 Address]).

ControlLogix Example

The following common Tags are used:

Tag Name	Type	Description
Local : 3 : I	AB: 1756_D...	1756-DNB I/O
Local : 3 : O	AB: 1756_D...	
Local : 3 : 5	AB: 1756_D...	
Drive Input Image	INT [10]	Input Image Table
Drive Output Image	INT [10]	Output Image Table

The following Tags are used for Drive 0:

Tag Name	Type	Description
Drive 0 Command Stop	BOOL	Logic Command bit 0 (STOP)
Drive 0 Command Start	BOOL	Logic Command bit 1 (START)
Drive 0 Command Jog	BOOL	Logic Command bit 2 (JOG)
Drive 0 Command Clear Faults	BOOL	Logic Command bit 3 (CLEAR FAULTS)
Drive 0 Command Forward	BOOL	Logic Command bit 4 (FORWARD)
Drive 0 Reference	INT	Speed Reference
Drive 0 Status Ready	BOOL	Logic Status bit 0 (READY)
Drive 0 Status Active	BOOL	Logic Status bit 1 (ACTIVE)
Drive 0 Status Forward	BOOL	Logic Status bit 3 (FORWARD)
Drive 0 Status Faulted	BOOL	Logic Status bit 7 (FAULT)
Drive 0 Status At Reference	BOOL	Logic Status bit 8 (AT SPEED)
Drive 0 Feedback	INT	Speed Feedback
Perform Parameter Read 0	BOOL	Initiates the parameter read
Parameter RD Value 0	INT	Read value of the parameter
Parameter RD Message 0	MESSAGE	Get_Attribute_Single (Read)

Tag Name	Type	Description
Perform Parameter Write 0	BOOL	Initiates the parameter value
Parameter WR Value 0	INT	Write value to the parameter
Parameter WR Message 0	MESSAGE	Set_Attribute_Single (Write)

The same type of Tags are also used for Drive 1 through Drive 4.

Main Routine

The Main Routine tells the 1756-DNB scanner to run, reads the network Input Image from the scanner, calls the various drive control subroutines, and writes the network Output Image to the scanner. See Figure 7.6.

Figure 7.6 Main Routine

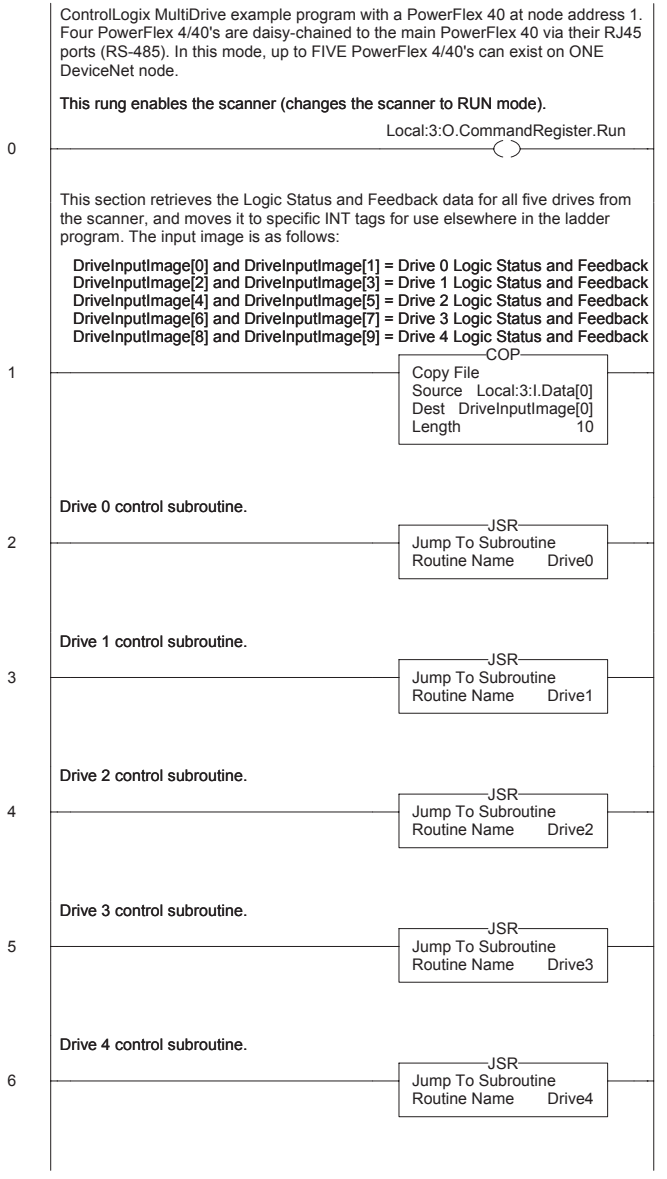
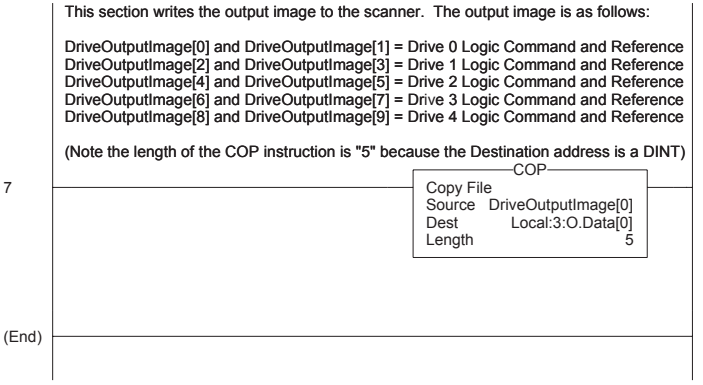

ControlLogix MultiDrive example program with a PowerFlex 40 at node address 1. Four PowerFlex 4/40's are daisy-chained to the main PowerFlex 40 via their RJ45 ports (RS-485). In this mode, up to FIVE PowerFlex 4/40's can exist on ONE DeviceNet node.
This rung enables the scanner (changes the scanner to RUN mode).
Local:3:O.CommandRegister.Run
0
This section retrieves the Logic Status and Feedback data for all five drives from the scanner, and moves it to specific INT tags for use elsewhere in the ladder program. The input image is as follows:
DriveInputImage[0] and DriveInputImage[1] = Drive 0 Logic Status and Feedback
DriveInputImage[2] and DriveInputImage[3] = Drive 1 Logic Status and Feedback
DriveInputImage[4] and DriveInputImage[5] = Drive 2 Logic Status and Feedback
DriveInputImage[6] and DriveInputImage[7] = Drive 3 Logic Status and Feedback
DriveInputImage[8] and DriveInputImage[9] = Drive 4 Logic Status and Feedback
1
COP
Copy File
Source Local:3:I.Data[0]
Dest DriveInputImage[0]
Length 10
Drive 0 control subroutine.
2
JSR
Jump To Subroutine
Routine Name Drive0
Drive 1 control subroutine.
3
JSR
Jump To Subroutine
Routine Name Drive1
Drive 2 control subroutine.
4
JSR
Jump To Subroutine
Routine Name Drive2
Drive 3 control subroutine.
5
JSR
Jump To Subroutine
Routine Name Drive3
Drive 4 control subroutine.
6
JSR
Jump To Subroutine
Routine Name Drive4

Figure 7.6 Main Routine (Continued)


This section writes the output image to the scanner. The output image is as follows:
DriveOutputImage[0] and DriveOutputImage[1] = Drive 0 Logic Command and Reference
DriveOutputImage[2] and DriveOutputImage[3] = Drive 1 Logic Command and Reference
DriveOutputImage[4] and DriveOutputImage[5] = Drive 2 Logic Command and Reference
DriveOutputImage[6] and DriveOutputImage[7] = Drive 3 Logic Command and Reference
DriveOutputImage[8] and DriveOutputImage[9] = Drive 4 Logic Command and Reference
(Note the length of the COP instruction is "5" because the Destination address is a DINT)
7
COP
Copy File
Source DriveOutputImage[0]
Dest Local:3:O.Data[0]
Length 5
(End)

Drive 0 - Drive 4 Control Routines

The Drive Control routines provide status information (Logic Status and Feedback), control (Logic Command and Reference), and parameter read/write for each of the respective drives. See Figure 7.7 for Drive 0, Figure 7.8 for Drive 1, Figure 7.9 for Drive 2, Figure 7.10 for Drive 3, and for Drive 4.

Figure 7.7 Drive 0 Control Routine

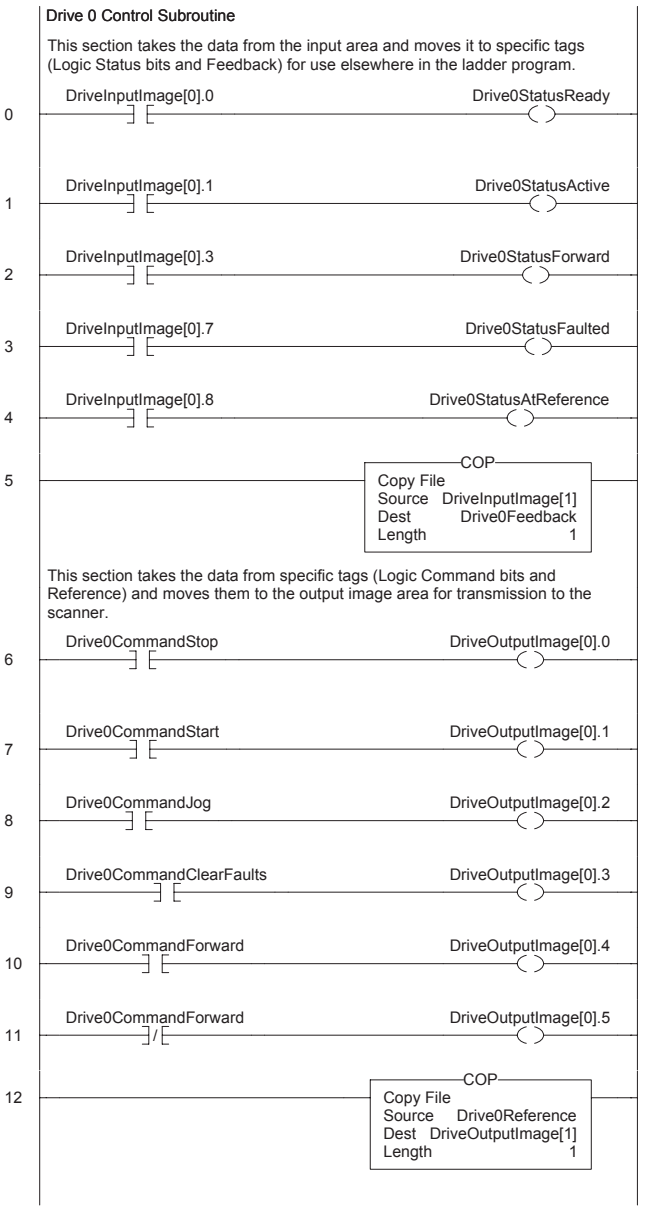


Figure 7.7 Drive 0 Control Routine (Continued)

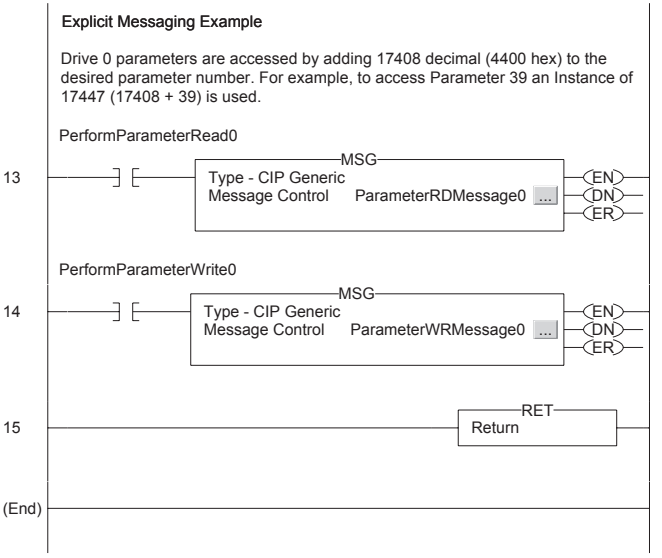


Figure 7.8 Drive 1 Control Routine

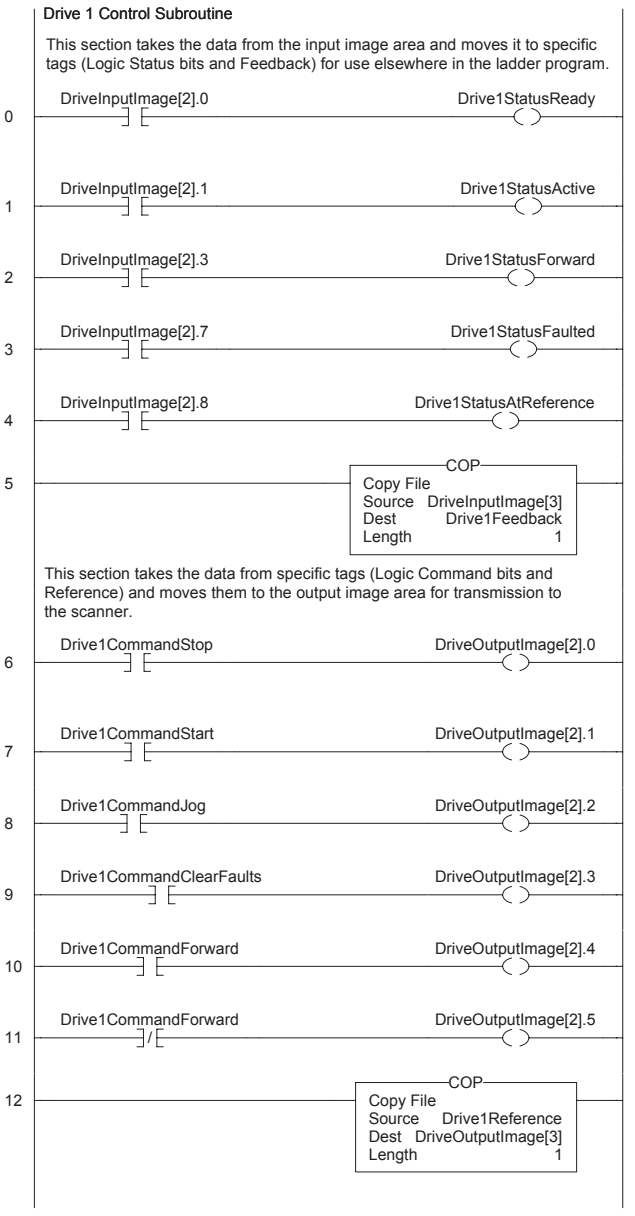


Figure 7.8 Drive 1 Control Routine (Continued)

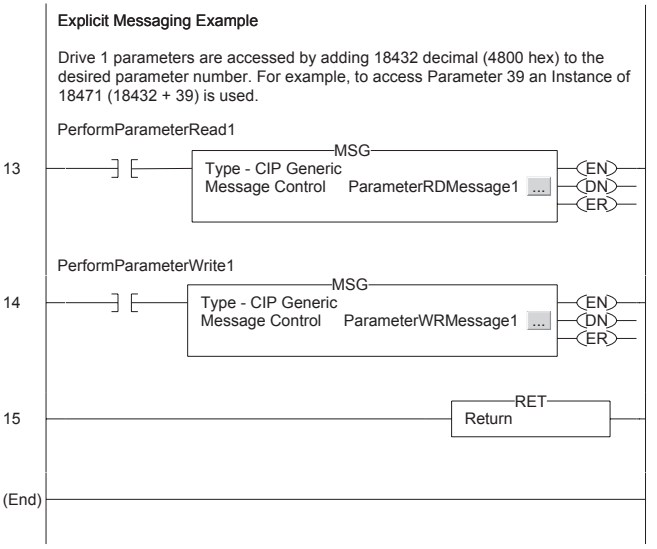


Figure 7.9 Drive 2 Control Routine

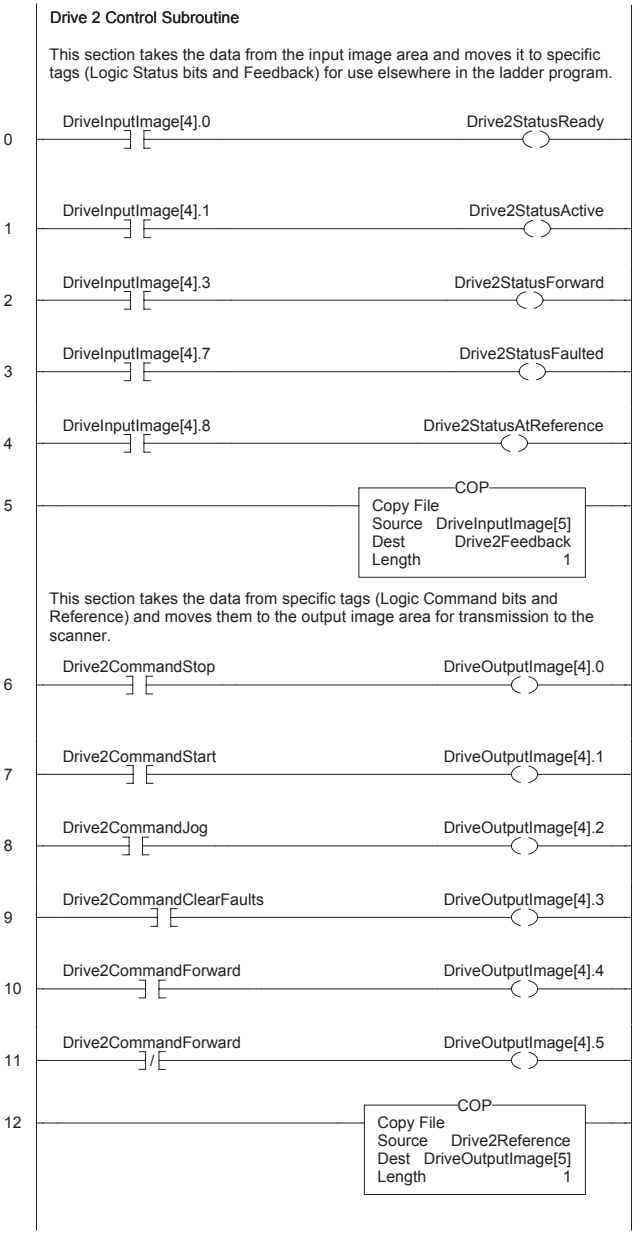


Figure 7.9 Drive 2 Control Routine (Continued)

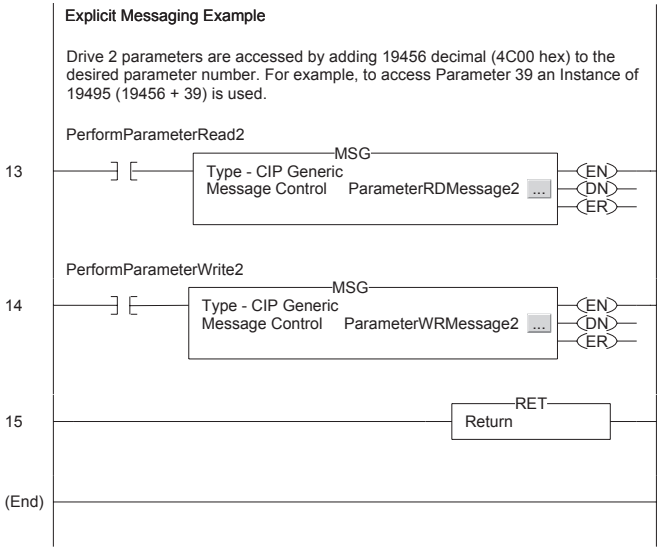


Figure 7.10 Drive 3 Control Routine

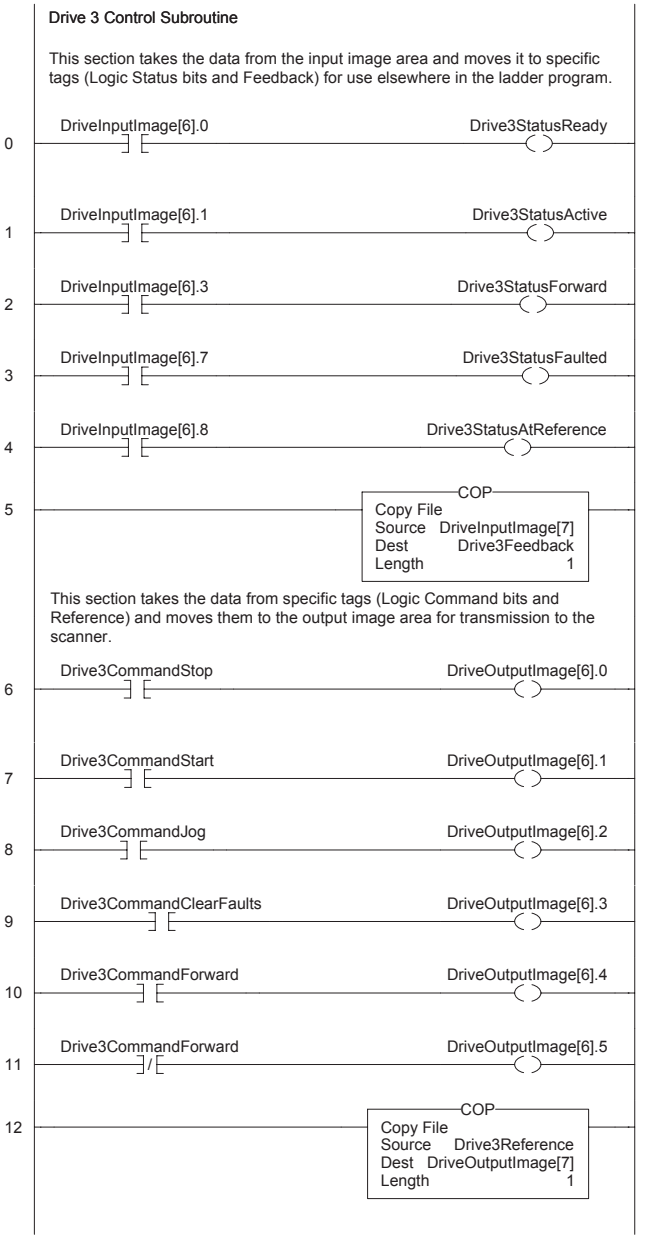


Figure 7.10 Drive 3 Control Routine (Continued)

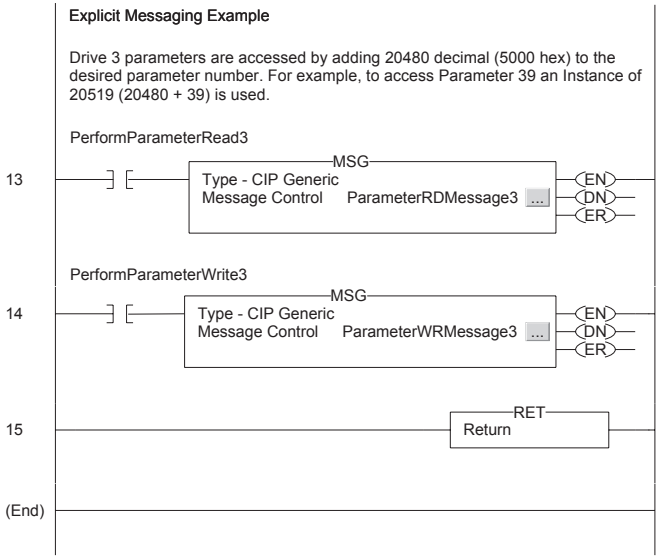


Figure 7.11 Drive 4 Control Routine

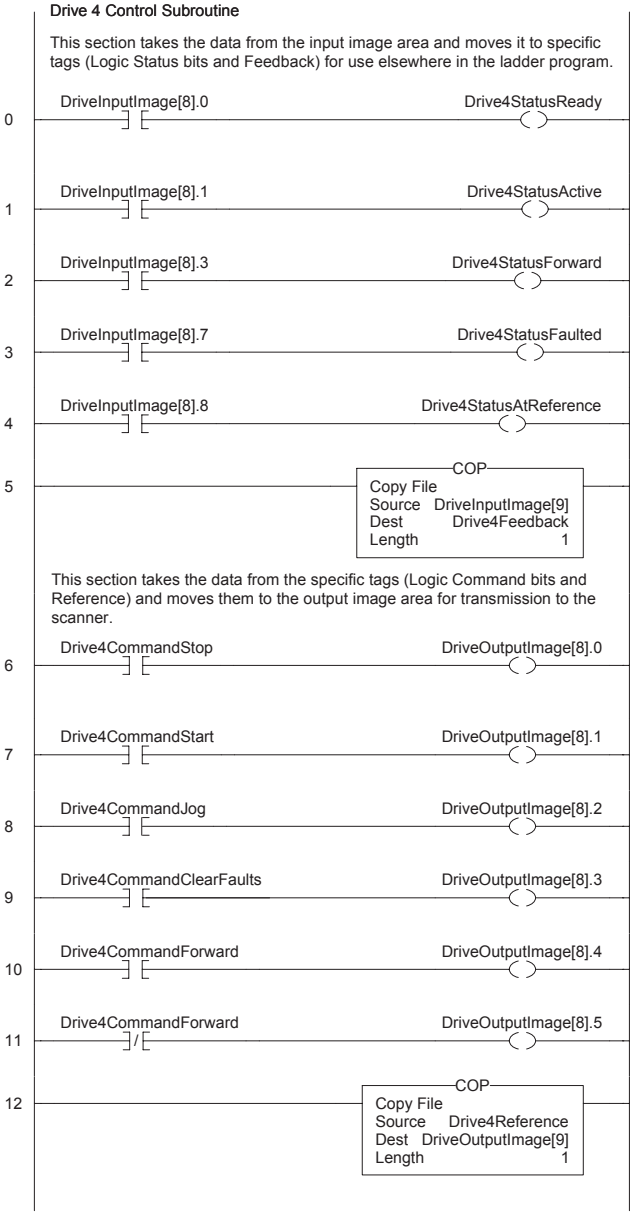
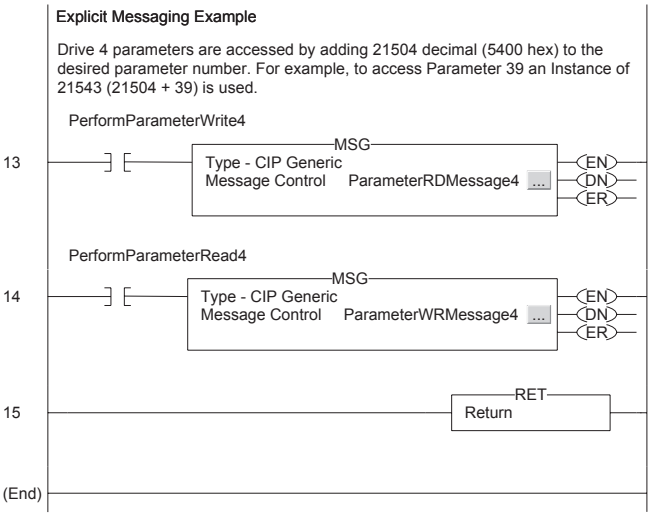


Figure 7.11 Drive 4 Control Routine (Continued)



Multi-Drive Mode Explicit Messaging

Parameter addressing for Explicit messaging is different in Multi-Drive than with Single mode. In Single mode, the Instance value in the message equals the desired parameter number in the drive. In Multi-Drive mode, an Instance table is used to account for the parameters in the adapter and up to 5 drives. The parameters in the adapter and each of the drives are offset by 400 hex (1024 decimal):

Instance	Device	Parameter
4000h (16384 dec) - 43FFh	22-COMM-D	0 - 1023
4400h (17408 dec) - 47FFh	Drive 0	0 - 1023
4800h (18432 dec) - 4BFFh	Drive 1	0 - 1023
4000h (19456 dec) - 4FFFh	Drive 2	0 - 1023
5000h (20480 dec) - 53FFh	Drive 3	0 - 1023
5400h (21504 dec) - 57FFh	Drive 4	0 - 1023

For example, to access **Parameter P39 - [Accel Time 1]** in each of the drives, the following Instances would be used:

Drive 0 Instance = 17447 (17408 + 39)
Drive 1 Instance = 18471 (18432 + 39)
Drive 2 Instance = 19495 (19456 + 39)
Drive 3 Instance = 20519 (20480 + 39)
Drive 4 Instance = 21543 (21504 + 39)

Drive 0 Explicit Message Example

The Explicit message examples in the ControlLogix example program perform a read (Get_Attribute_Single) and a write (Set_Attribute_Single) to **Parameter 39 - [Accel Time 1]**. The configuration for the read is shown in Figure 7.12 and the write is shown in Figure 7.13.

Figure 7.12 Parameter Read Message Configuration

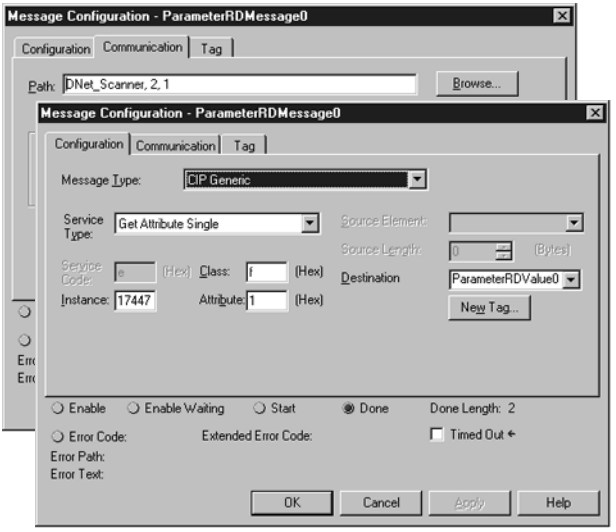
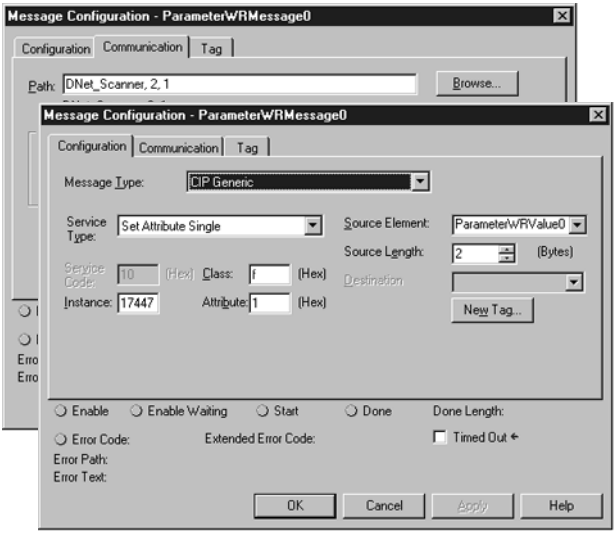


Figure 7.13 Parameter Write Message Configuration



The Class Code is “ f ” for the Parameter Object and the Instance Attribute is “1” to select retrieving the parameter value. See Appendix C, Parameter Object for more information. The Instance value is “17447” to access **Parameter 39 - [Accel Time 1]**.

The Explicit messages for Drive 1 to Drive 4 are identical except for the Instance values:

Drive 1 Instance = 18471 (18432 + 39)
Drive 2 Instance = 19495 (19456 + 39)
Drive 3 Instance = 20519 (20480 + 39)
Drive 4 Instance = 21543 (21504 + 39)

Additional Information

- When the PowerFlex 40 with the 22-COMM-D (Drive 0) is powered up, all configured daisy-chained drives must be present before an I/O connection is allowed on DeviceNet (i.e. before the drives can be controlled).
- If the PowerFlex 40 with the 22-COMM-D adapter (Drive 0) is powered down, communications with the four daisy-chained drives (Drive 1 to Drive 4) are disrupted and the drives will fault.
- If any of the daisy-chained drives (Drive1 to Drive 4) are powered down, the respective Input Image (Logic Status and Feedback) sent to the scanner will be zeros, and the NET A and PORT LEDs on the 22-COMM-D adapter will flash red. Status information from the scanner will not indicate there is a fault at the node.

Troubleshooting

Chapter 8 contains troubleshooting information.

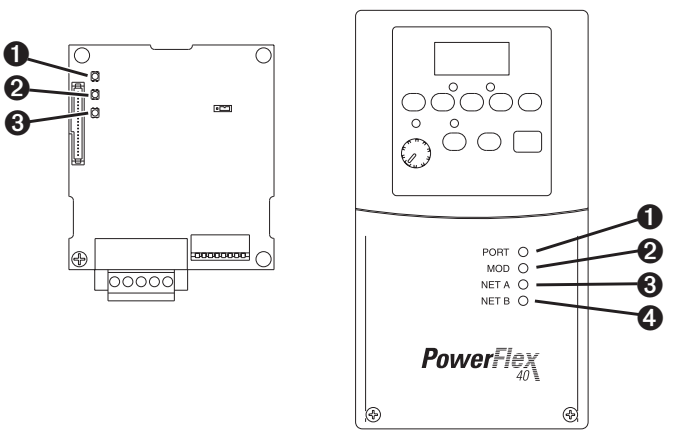
Topic	Page
Locating the Status Indicators	8-1
PORT Status Indicator	8-2
MOD Status Indicator	8-3
Net A Status Indicator	8-4

Topic	Page
Module Diagnostic Items in Single Drive Mode	8-4
Module Diagnostic Items in Multi-Drive Mode	8-5
Viewing and Clearing Events	8-6

Locating the Status Indicators

The DeviceNet adapter has three status indicators. They can be viewed on the adapter or through the drive cover. See Figure 8.1.

Figure 8.1 Status Indicators *(location on drive may vary)*



Number	Status Indicator	Description	Page
❶	PORT	DSI Connection Status	8-2
❷	MOD	Adapter Status	8-3
❸	NET A	DeviceNet Status	8-4
❹	NET B	Not Used for DeviceNet	

PORT Status Indicator

Status	Cause	Corrective Action
Off	The adapter is not powered or is not connected properly to the drive.	• Securely connect the adapter to the drive using the ribbon cable. • Apply power to the drive.
Flashing Red	The adapter is not receiving communication from the drive, connected drive is faulted, or a drive is missing in Multi-Drive mode.	• Clear any drive faults. • Verify that cables are securely connected. • Cycle power to the drive.
Solid Red	The drive has refused an I/O connection from the adapter. Another DSI peripheral is using the same DSI port as the adapter.	**Important:** Cycle power to the product after making the following correction: Verify that all DSI cables are securely connected and not damaged. Replace cables if necessary.
Flashing Green	The adapter is establishing an I/O connection to the drive or [DSI I/O Config] is configured for all I/O disabled.	• No Action. This status indicator will turn solid green or red. • Verify Parameter 15, [DSI I/O Config] settings. • Normal behavior if no DSI I/O is enabled.
Solid Green	The adapter is properly connected and is communicating with the drive.	No Action.
Orange	Daisy-chained drives in Multi-Drive mode are not all Allen-Bradley drives (PowerFlex 4/40).	Use Allen-Bradley PowerFlex 4/40's for the daisy-chained drives.

MOD Status Indicator

Status	Cause	Corrective Action
Off	The adapter is not powered.	• Securely connect the adapter to the drive using the ribbon cable. • Apply power to the drive.
Flashing Red	The adapter has failed the firmware test, connected drive is faulted, or a drive is missing in Multi-Drive mode.	• Clear faults in the drive. • Cycle power to the drive. • If cycling power does not correct the problem, the parameter settings may have been corrupted. Reset defaults and reconfigure the module. • If resetting defaults does not correct the problem, flash the adapter with the latest firmware release. • For Multi-Drive mode, determine which drive is missing or faulted. Check cabling and configuration settings (see Configuring the RS-485 Network section in Chapter 7).
Solid Red	The adapter has failed the hardware test.	• Cycle power to the drive. • Replace the adapter.
Flashing Green	The adapter is operational, but is not transferring I/O data.	• Place the scanner in RUN mode. • Program the controller to recognize and transmit I/O to the adapter. • Configure the adapter for the program in the controller. • Normal behavior if no DSI I/O is enabled.
Solid Green	The adapter is operational and transferring I/O data.	No Action.

Net A Status Indicator

Status	Cause	Corrective Actions
Off	The adapter and/or network is not powered or adapter is not connected properly to the network.	• Securely connect the adapter to the drive using the Internal Interface cable and to the network using a DeviceNet cable. • Correctly connect the DeviceNet cable to the DeviceNet plug. • Apply power to the drive and network.
Flashing Red	A DeviceNet I/O connection has timed out.	• Place the scanner in RUN mode, or apply power to the peer device that will send I/O. • Check the amount of traffic on the network.
Solid Red	Failed duplicate node detection test or bus off condition exists.	• Configure the adapter to use a unique node address on the DeviceNet network. • Configure the adapter to use the correct network data rate. • Ensure network has correct media installed.
Flashing Green	The adapter is properly connected but is not communicating with any devices on the network.	• Place the controller in RUN mode, or apply power to the peer device that will send I/O. • Program a controller or peer device to recognize and transmit I/O to the adapter. • Configure the adapter for the program in the controller or the I/O from the peer device.
Solid Green	The adapter is properly connected and communicating on the network.	No action required.

Module Diagnostic Items in Single Drive Mode

The following diagnostic items can be accessed using DriveExplorer (version 3.01 or higher).

No.	Name	Description
1	Field Flash Cnt	The number of flash updates made to the adapter after shipping.
2	Adapter Events	The number of events in the event queue.
3	Reference	Reference being transmitted to the host by this peripheral.
4	Logic Cmd	Command being transmitted to the host by this peripheral.
5	Logic Sts	Status being received from the host by this peripheral.
6	Feedback	Feedback being received from the host by this peripheral.
7	DN Rx Errors	Current value of the DeviceNet CAN Receive Error Counter register.
8	DN Tx Errors	Current value of the DeviceNet CAN Transmit Error Counter register.
9	Data Rate SW	Current setting of the adapter 2-bit data rate switch.
10	Node Address SW	Current setting of the adapter 6-bit Node address switch.

Module Diagnostic Items in Multi-Drive Mode

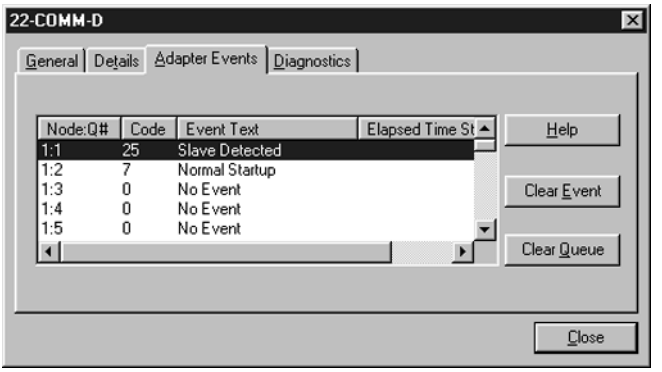
The following diagnostic items can be accessed using DriveExplorer (version 3.01 or higher).

No.	Name	Description
1	Field Flash Cnt	The number of flash updates made to the adapter after shipping.
2	Adapter Events	The number of events in the event queue.
3	Drv 0 Reference	Reference being transmitted from the adapter to DSI drive 0.
4	Drv 0 Logic Cmd	Command being transmitted from the adapter to DSI drive 0.
5	Drv 0 Logic Sts	Status of DSI drive 0 being received by the adapter.
6	Drv 0 Feedback	Feedback from DSI drive 0 being received by the adapter.
7	Drv 1 Reference	Reference being transmitted from the adapter to DSI drive 1.
8	Drv 1 Logic Cmd	Command being transmitted from the adapter to DSI drive 1.
9	Drv 1 Logic Sts	Status of DSI drive 1 being received by the adapter.
10	Drv 1 Feedback	Feedback from DSI drive 1 being received by the adapter.
11	Drv 2 Reference	Reference being transmitted from the adapter to DSI drive 2.
12	Drv 2 Logic Cmd	Command being transmitted from the adapter to DSI drive 2.
13	Drv 2 Logic Sts	Status of DSI drive 2 being received by the adapter.
14	Drv 2 Feedback	Feedback from DSI drive 2 being received by the adapter.
15	Drv 3 Reference	Reference being transmitted from the adapter to DSI drive 3.
16	Drv 3 Logic Cmd	Command being transmitted from the adapter to DSI drive 3.
17	Drv 3 Logic Sts	Status of DSI drive 3 being received by the adapter.
18	Drv 3 Feedback	Feedback from DSI drive 3 being received by the adapter.
19	Drv 4 Reference	Reference being transmitted from the adapter to DSI drive 4.
20	Drv 4 Logic Cmd	Command being transmitted from the adapter to DSI drive 4.
21	Drv 4 Logic Sts	Status of DSI drive 4 being received by the adapter.
22	Drv 4 Feedback	Feedback from DSI drive 4 being received by the adapter.
23	DN Rx Errors	Current value of the DeviceNet CAN Receive Error Counter register.
24	DN Tx Errors	Current value of the DeviceNet CAN Transmit Error Counter register.
25	Data Rate SW	Current setting of the adapter 2-bit data rate switch.
26	Node Address SW	Current setting of the 6-bit Node address switch.

Viewing and Clearing Events

The adapter maintains an event queue that reports the history of its actions. You can view the event queue using DriveExplorer (3.01) software.

Figure 8.2 DriveExplorer Event View/Clear Screen



Events

Many events in the Event queue occur under normal operation. If you encounter unexpected communications problems, the events may help you or Allen-Bradley personnel troubleshoot the problem. The following events may appear in the event queue:

Code	Event	Description
0	No Event	Text displayed in an empty event queue entry.
1	Host Sent Reset	The DSI product issued this because it was reset.
2	EEPROM Sum Flt	Startup sequence detected corrupt EEPROM storage.
3	Reserved	
4	Control Disabled	Sets the PCCC to zero.
5	Control Enabled	Sets the PCCC timeout to non-zero and sends a PCCC control command.
6	PCCC IO Time Flt	Control by a PCCC device has timed out.
7	Normal Startup	Signifies the first event after a reset or power cycle.
8	Reserved	
9	DSI Fault Msg	DSI drive faulted.
10	DN Poll Timeout	DeviceNet did not send an I/O poll message in the required time interval.
11	DN I/O Too Long	The length of the data from the I/O scanner was too long.
12	Bad I/O Fragment	An I/O fragment from the scanner arrived out of sequence.
13	Idle I/O Message	The DeviceNet scanner was placed in the program mode.
14	Reserved	
15	DSI Fault Clear	A drive fault was cleared.
16	DN COS Timeout	I/O data from a DeviceNet COS connection has not been received in the required interval.
17	DN Poll Allocate	The adapter was allocated for a DeviceNet polled I/O connection.
18	DN COS Allocate	The adapter was allocated for a DeviceNet COS I/O connection.
19	DN Poll Closed	The DeviceNet master has closed the previous opened polled I/O connection.
20	DN COS Closed	The DeviceNet master has closed the previously opened COS I/O connection.
21	DN Dup MAC Flt	The DeviceNet side of the adapter has failed the duplicate MAC test.
22	Manual Reset	The adapter was reset from the “Reset Module” parameter.
23	Host Timeout	An explicit message to a Drive host has timed out waiting for a response.
24	Slave Timeout	An explicit message to a Slave has timed out waiting for a response.
25	Slave Detected	A DSI slave was detected on the /slave I/O line.
26	Slave Removed	A DSI slave was removed from the /slave I/O line.
27	Language CRC Bad	The language flash segment is corrupt.

Notes:

Specifications

This chapter present the specifications for the adapter.

Topic	Page
Communications	A-1
Electrical	A-1
Mechanical	A-1

Topic	Page
Environmental	A-2
Regulatory Compliance	A-2

Communications

Network	
Protocol	DeviceNet
Data Rates	125K, 250K, 500K, Autobaud
Drive	
Protocol	DSI

Electrical

Consumption	
Drive	150 mA at 5V supplied through the drive
Network	60 mA at 24V supplied through DeviceNet Use the 60 mA value to size the network current draw from the power supply.

Mechanical

Dimensions	
Height	19 mm (0.75 inches)
Length	86 mm (3.39 inches)
Width	78.5 mm (3.09 inches)
Weight	85 g (3 oz.)

Environmental

Temperature Operating Storage	 -10 to +50 °C (14 to 149 °F) -40 to +85 °C (-40 to +185 °F)
Relative Humidity	-5 to 95% non-condensing

Regulatory Compliance

Certification	Specification
UL	UL508C
cUL	CAN / CSA C22.2 No. 14-M91
CE	EN50178 and EN61800-3

Adapter Parameters

Appendix B provides information about the DeviceNet adapter parameters.

Topic	Page
About Parameter Numbers	B-1
Parameter List	B-1

About Parameter Numbers

The parameters in the adapter are numbered consecutively. However, depending on which configuration tool you use, they may have different numbers.

Configuration Tool	Numbering Scheme
• DriveExplorer • DriveTools 2000 • HIM	The adapter parameters begin with parameter 1. For example, Parameter 01 - [Mode] is parameter 1 as indicated by this manual.
• Explicit Messaging • RSNetWorx for DeviceNet	The adapter parameters are appended to the list of drive parameters. For example, with a drive with 300 parameters, Parameter 01- [Mode] is parameter 301.

Parameter List

Parameter No.	Name and Description	Details	
01	**[Mode]** Displays the Single or Multi-Drive operating mode selected with the jumper on the adapter.	Default: Values: Type:	0 = Single Drive 0 = Single Drive 1 = Multiple Drive Read Only
02	**[DN Addr Cfg]** Sets the node address used by the drive after a reset or power cycle. This setting is used when all of the adapter DIP switches are in the CLOSED position (all 0's).	Default: Minimum: Maximum: Type: Reset Required:	63 0 63 Read/Write Yes
03	**[DN Addr Act]** Displays DeviceNet node address currently being used by the adapter.	Default: Minimum: Maximum: Type:	63 0 63 Read Only

Parameter No.	Name and Description	Details	
04	**[DN Rate Cfg]** Sets the DeviceNet data rate after a reset or power cycle. This setting is used when all of the adapter DIP switches are in the CLOSED position (all 0's).	Default: Values: Type: Reset Required:	3 = Autobaud 0 = 125 kbps 1 = 250 kbps 2 = 500 kbps 3 = Autobaud Read/Write Yes
05	**[DN Rate Act]** Displays DeviceNet data rate currently being used by the adapter.	Default: Values: Type:	0 = 125 kbps 0 = 125 kbps 1 = 250 kbps 2 = 500 kbps Read Only
06	**[Reset Module]** No action if set to "Ready." Resets the adapter if set to "Reset Module." Restores the adapter to its factory default settings if set to "Set Defaults." This parameter is a command. It will be reset to "0 = Ready" after the command has been performed.	Default: Values Type: Reset Required:	0 = Ready 0 = Ready 1 = Reset Module 2 = Set Defaults Read/Write No
	 ATTENTION: Risk of injury or equipment damage exists. If the adapter is transmitting I/O that controls the drive, the drive may fault when you reset the adapter. Determine how your drive will respond before resetting a connected adapter.		
07	**[Comm Flt Action]** Sets the action that the adapter and drive take if the adapter detects that DeviceNet communications have been disrupted. This setting is effective only if I/O that controls the drive is transmitted through the adapter.	Default: Values: Type: Reset Required:	0 = Fault 0 = Fault 1 = Stop 2 = Zero Data 3 = Hold Last 4 = Send Flt Cfg Read/Write No
	 ATTENTION: Risk of injury or equipment damage exists. **Parameter 07 - [Comm Flt Action]** lets you determine the action of the adapter and connected drive if communications are disrupted. By default, this parameter faults the drive. You can set this parameter so that the drive continues to run. Precautions should be taken to ensure that the setting of this parameter does not create a hazard of injury or equipment damage.		
08	**[Idle Flt Action]** Sets the action that the adapter and drive take if the adapter detects that scanner is idle because the controller was switched to program mode. This setting is effective only if I/O that controls the drive is transmitted through the adapter.	Default: Values: Type: Reset Required:	0 = Fault 0 = Fault 1 = Stop 2 = Zero Data 3 = Hold Last 4 = Send Flt Cfg Read/Write No
	 ATTENTION: Risk of injury or equipment damage exists. **Parameter 08 - [Idle Flt Action]** lets you determine the action of the adapter and connected drive if the scanner is idle. By default, this parameter faults the drive. You can set this parameter so that the drive continues to run. Precautions should be taken to ensure that the setting of this parameter does not create a hazard of injury or equipment damage.		

Parameter No.	Name and Description	Details
09	**[DN Act Cfg]** Displays the source from which the adapter node address and data rate are taken. This will either be switches or parameters in EEPROM. It is determined by the settings of the switches on the adapter.	Default: 0 = Switches Values: 0 = Switches 1 = EEPROM Type: Read Only
10	**[Flt Cfg Logic]** Sets the Logic Command data that is sent to the drive if any of the following is true: • Parameter 07 - [Comm Flt Action] is set to Send Flt Cfg and communications are disrupted. • Parameter 08 - [Idle Flt Action] is set to Send Flt Cfg and the scanner is put into Program or Test mode. The bit definitions will depend on the product to which the adapter is connected.	Default: 0 Minimum: 0 Maximum: 65535 Type: Read/Write Reset Required: No
11	**[Flt Cfg Ref]** Sets the Reference data that is sent to the drive if any of the following is true: • Parameter 07 - [Comm Flt Action] is set to Send Flt Cfg and communications are disrupted. • Parameter 08 - [Idle Flt Action] is set to Send Flt Cfg and the scanner is put into Program mode.	Default: 0 Minimum: 0 Maximum: 65535 Type: Read/Write Reset Required: No **Important:** If the drive uses a 16-bit Reference, the most significant word of this value must be set to zero (0) or a fault will occur.
12	**[COS Status Mask]** Sets the mask of the 16-bit Logic Status word. Unless they are masked out, the bits in the Logic Status word are checked for changes when the adapter is allocated using COS (Change of State). If a bit changes, it is reported as a change in the Change of State operation. If the mask bit is 0 (Off), the bit is ignored. If the mask bit is 1 (On), the bit is checked. **Important:** The bit definitions in the Logic Status word depend on the drive.	Default: 0 Minimum: 0 Maximum: 65535 Type: Read/Write Reset Required: No
13	**[COS Fdbk Change]** Sets the hysteresis band to determine how much the Feedback word can change before it is reported as a change in the COS (Change of State) operation.	Default: 0 Minimum: 0 Maximum: 65535 Type: Read/Write Reset Required: No
14	**[COS/Cyc Interval]** Displays amount of time that a scanner will wait to check for data in the adapter. When COS (Change of State) data exchange has been set up, this is the maximum amount of time between scans. Scans will happen sooner if data changes. When Cyclic data exchange has been set up, this interval is the fixed time between scans. This interval is the heartbeat rate configured in the scanner.	Default: 0.000 Seconds Minimum: 0.000 Seconds Maximum: 65.535 Seconds Type: Read Only

Parameter No.	Name and Description	Details	
15	**[DSI I/O Cfg]** Sets the configuration of the Drives that are active in the Multi-Drive mode. Identifies the connections that would be attempted on a reset or power cycle.	Default: Values: Type: Reset Required:	0001 0 = Drive 0 1 = Drives 0-1 2 = Drives 0-2 3 = Drives 0-3 4 = Drives 0-4 Read/Write Yes
16	**[DSI I/O Act]** Displays the Drives that are active in the Multi-Drive mode.	Default: Bit Values: Type:	0001 0 = Drive 0 1 = Drives 0-1 2 = Drives 0-2 3 = Drives 0-3 4 = Drives 0-4 Read Only
17 18 19 20 21	**[Drv 0 Addr]** **[Drv 1 Addr]** **[Drv 2 Addr]** **[Drv 3 Addr]** **[Drv 4 Addr]** Sets the corresponding node addresses of the daisy-chained drives when the adapter Mode Jumper (J2) is set for Multi-Drive operation. **Important:** The settings for these parameters must match the Parameter A104 - [Comm Node Addr] settings in the respective drives. Each setting must also be unique (no duplicate node address).	Default: Default: Default: Default: Default: Minimum: Maximum: Type: Reset Required:	1 2 3 4 5 1 247 Read/Write Yes

DeviceNet Objects

Appendix C presents information about the DeviceNet objects that can be accessed using Explicit Messages. For information on the format of Explicit Messages and example ladder logic programs, refer to Chapter 6, Using Explicit Messaging.

Object	Class Code		Page
	Hex.	Dec.	
Identity Object	0x01	1	C-2
Connection Object	0x05	5	C-4
Register Object	0x07	7	C-6
Parameter Object	0x0F	15	C-8
Parameter Group Object	0x10	16	C-11
PCCC Object	0x67	103	C-13

TIP: Refer to the DeviceNet specification for more information about DeviceNet objects. Information about the DeviceNet specification is available on the ODVA web site (http://www.odva.org).

Identity Object

Class Code

Hexadecimal	Decimal
0x01	1

Instances (Single-Drive Mode)

The number of instances is fixed at three and is as shown below:

Instance	Description
0	Class
1	Host drive
2	22-COMM-D
3	22-SCM-232 or 22-HIM-* (when present)

Instances (Multi-Drive Mode)

The number of instances is fixed at one and is as shown below:

Instance	Description
0	Class
1	22-COMM-D

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Revision	UINT	1
2	Get	Max Instance	UINT	Maximum Instance Number

Identity Object *(Continued)*

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Vendor ID	UINT	1 = Allen-Bradley
2	Get	Device Type	UINT	
3	Get	Product Code	UINT	Unique number identifying the product name and rating
4	Get	Revision	Struct of USINT USINT	Product Revision: Major Minor
5	Get	Status	WORD	Bit 0 = Owned Bit 2 = Configured Bit 10 = Recoverable fault Bit 11 = Unrecoverable fault
6	Get	Serial Number	UDINT	Unique 32-bit number
7	Get	Product Name	SHORT_ STRING	Product name and rating

Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x01	Yes	Yes	Get_Attributes_All
0x05	Yes	No	Reset
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	No	Set_Attribute_Single

Connection Object

Class Code

Hexadecimal	Decimal
0x05	5

Instances

Instance	Description
1	Master-Slave Explicit Message Connection
2	Polled I/O Connection
4	Change of State/Cyclic Connection
6 – 10	Explicit Message Connection

Instance Attributes

Refer to the DeviceNet Specification for more information.

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	State	USINT	0 = Nonexistent 1 = Configuring 2 = Waiting for connection ID 3 = Established 4 = Timed out
2	Get	Instance Type	USINT	0 = Explicit Message 1 = I/O Message
3	Get	Transport Class Trigger	USINT	The Transport Class Trigger for this instance
4	Get	Produced Cnxn ID	USINT	CAN Identifier to transmit on
5	Get	Consumed Cnxn ID	USINT	CAN Identifier to receive on
6	Get	Initial Comm Char	USINT	Defines the DeviceNet message groups that the tx/rx Cnxn's apply
7	Get	Produced Cnxn Size	UINT	Max bytes to transmit across this connection
8	Get	Consumed Cnxn Size	UINT	Max bytes to receive across this connection
9	Get/Set	EPR	UINT	Expected Packet Rate (timer resolution = 2 msec.)
12	Get/Set	Watchdog Action	USINT	0 = Transition to timed out 1 = Auto delete 2 = Auto reset

Connection Object *(Continued)*

Instance Attributes (Continued)

Refer to the DeviceNet Specification for more information.

Attribute ID	Access Rule	Name	Data Type	Description
13	Get	Produced Path Length	UINT	Number of bytes of data in the produced connection path
14	Get	Produced Connection Path	ARRAY of UINT	Byte stream which defines Application objects whose data is to be produced by this Connection object
15	Get	Consumed Path Length	UINT	Number of bytes of data in the consumed connection path
16	Get	Consumed Connection Path	ARRAY of USINT	Byte stream which defines Application objects whose data is to be consumed by this Connection object

Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	No(1)	Yes	Get_Attribute_Single

(1) This service does not support class access.

Register Object

Class Code

Hexadecimal	Decimal
0x07	7

Instances

The number of instances is fixed at thirteen and is as shown below:

Instance	Description
0	Class
1	Command and reference for all drives (read/write)
2	Status and feedback for all drives (read-only)
3	Command and reference for Drive 0 (read/write)
4	Status and feedback for Drive 0 (read-only)
5	Command and reference for Drive 1 (read/write)
6	Status and feedback for Drive 1 (read-only)
7	Command and reference for Drive 2 (read/write)
8	Status and feedback for Drive 2 (read-only)
9	Command and reference for Drive 3 (read/write)
10	Status and feedback for Drive 3 (read-only)
11	Command and reference for Drive 4 (read/write)
12	Status and feedback for Drive 4 (read-only)
13	Masked Command write for all drives (read/write)(1)

(1) The Data instance attribute for the masked command is the same size as the data attribute for instance 1. However, the structure is a Command word followed by a mask word for each drive. The Logic Command for each drive is set to the value of the first word of the data where there are ones in the second word of the data.

Logic Command = ((Command word and not mask word) or (command word and mask word))

If a drive is not present, the Data instance attributes for that individual drive will contain values of zero and the Bad Flag instance attribute will be set.

The size of the Data instance attribute for instances 1, 2, and 13 will change depending upon the number of drives for which the adapter is configured.

Register Object *(Continued)*

Class Attributes

Not supported.

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Bad Flag	BOOL	If set to 1, then attribute 4 may contain invalid, bad or otherwise corrupt data. 0 = good 1 = bad
2	Get	Direction	BOOL	Direction of data transfer 0 = Producer Register 1 = Consumer Register
3	Get	Size	UINT	Size of register data in bits
4	Conditional(1)	Data	ARRAY of BITS	Data to be transferred

(1) The access rule of Set is optional if attribute 2, Direction = 1. If Direction = 0, the access rule is Get.

Important: Setting a register object attribute can only be accomplished through a connection with a non-zero expected packet rate (EPR). This feature is to prevent accidental control of a DSI device.

Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	No	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

Parameter Object

Class Code

Hexadecimal	Decimal
0x0F	15

Instances (Single-Drive Mode)

The number of instances is as shown below:

Instance	Description
0	Class
1	Drive Parameter 1
↕	↕
n	Drive Parameter n
n + 1	Adapter Parameter 1
↕	↕
n + 21	Adapter Parameter 21

Instances (Multi-Drive Mode)

The number of instances is fixed at 21 and is as shown below:

Instance	Description
0	Class
1	Adapter Parameter 1
↕	↕
21	Adapter Parameter 21

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Revision	UINT	1
2	Get	Max Instance	UINT	Number of parameters
8	Get	Parameter Class Descriptor	WORD	Bits that describe parameters.
9	Get	Configuration Assembly Instance	UINT	0
10	Get	Native Language	USINT	0 = English 1 = French 2 = Spanish 3 = Italian 4 = German 5 = Japanese 6 = Portuguese 7 = Mandarin Chinese 8 = Russian 9 = Dutch

Parameter Object *(Continued)*

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	(1)	Parameter Value	(2)	(3)
2	Get	Link Path Size	USINT	0 = No link specified n = Link specified
3	Get	Link Path		(4)
4	Get	Descriptor	WORD	0 = False, 1 = True Bit 1 = Supports ENUMs Bit 2 = Supports scaling Bit 3 = Supports scaling links Bit 4 = Read only Bit 5 = Monitor Bit 6 = Extended precision scaling
5	Get	Data Type	USINT	C3 = INT C7 = UINT D2 = WORD (16-bit)
6	Get	Data Size	USINT	(3)
7	Get	Parameter Name String	SHORT_ STRING	(3)
8	Get	Units String	SHORT_ STRING	(3)
9	Get	Help String	SHORT_ STRING	0
10	Get	Minimum Value	(1)	(3)
11	Get	Maximum Value	(1)	(3)
12	Get	Default Value	(1)	(3)
13	Get	Scaling Multiplier	UINT	(3)
14	Get	Scaling Divisor	UINT	(3)
15	Get	Scaling Base	UINT	(3)
16	Get	Scaling Offset	UINT	(3)
17	Get	Multiplier Link	UINT	(3)
18	Get	Divisor Link	UINT	(3)
19	Get	Base Link	UINT	(3)
20	Get	Offset Link	UINT	(3)
21	Get	Decimal Precision	USINT	(3)

(1) Access rule is defined in bit 4 of instance attribute 4. 0 = Get/Set, 1 = Get.

(2) Specified in descriptor, data type, and data size.

(3) Value varies based on parameter instance.

(4) Refer to the DeviceNet specification for a description of the connection path.

Parameter Object *(Continued)*

Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x01	No	Yes	Get_Attribute_All
0x05	Yes	No	Reset
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single
0x4B	No	Yes	Get_Enum_String

Parameter Group Object

Class Code

Hexadecimal	Decimal
0x10	16

Instances (Single-Drive Mode)

The number of instances depends on the number of groups in the drive. A group of adapter parameters is appended to the list of groups in the drive.

Instance	Description
0	Class
1	Drive Group 1 Attributes
↕	↕
n	Drive Group n Attributes
n + 1	Adapter Group Attributes

Instances (Multi-Drive Mode)

The number of instances is fixed at one and is as shown below:

Instance	Description
0	Class
1	Adapter Group Attributes

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Parameter group version	UINT	1
2	Get	Max Instance	UINT	Total number of groups
8	Get	Native Language	USINT	0 = English 1 = French 2 = Spanish (Mexican) 3 = Italian 4 = German 5 = Japanese 6 = Portuguese 7 = Mandarin Chinese 8 = Russian 9 = Dutch

Parameter Group Object *(Continued)*

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Group Name String	SHORT_ STRING	Group name
2	Get	Number of Members in Group	UINT	Number of parameters in group.
3	Get	1st Parameter Number in Group	UINT	(1)
4	Get	2nd Parameter Number in Group	UINT	(1)
↕		↕		
n	Get	n Parameter Number in Group	UINT	(1)

(1) Value varies based on group instance.

Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single

PCCC Object

Class Code

Hexadecimal	Decimal
0x67	103

Instances

Not supported

Class Attributes

Not supported.

Instance Attributes

Not supported.

Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x4B	Yes	Yes	Execute_PCCC
0x4D	Yes	Yes	Execute_Local_PCCC

PCCC Object *(Continued)*

Message Structure for Execute_PCCC

Request			Response		
Name	**Data Type**	**Description**	**Name**	**Data Type**	**Description**
Length	USINT	Length of requestor ID	Length	USINT	Length of requestor ID
Vendor	UINT	Vendor number of requestor	Vendor	UINT	Vendor number of requestor
Serial Number	UDINT	ASA serial number of requestor	Serial Number	UDINT	ASA serial number of requestor
Other	Product Specific	Identifier of user, task, etc. on the requestor	Other	Product Specific	Identifier of user, task, etc. on the requestor
CMD	USINT	Command byte	CMD	USINT	Command byte
STS	USINT	0	STS	USINT	Status byte
TNSW	UINT	Transport word	TNSW	UINT	Transport word. Same value as the request.
FNC	USINT	Function code. Not used for all CMD's.	EXT_STS	USINT	Extended status. Not used for all CMD's.
PCCC_ params	ARRAY of USINT	CMD/FNC specific parameters	PCCC_ results	ARRAY of USINT	CMD/FNC specific result data

Message Structure for Execute_Local_PCCC

Request			Response		
Name	**Data Type**	**Description**	**Name**	**Data Type**	**Description**
CMD	USINT	Command byte	CMD	USINT	Command byte
STS	USINT	0	STS	USINT	Status byte
TNSW	UINT	Transport word	TNSW	UINT	Transport word. Same value as the request.
FNC	USINT	Function code. Not used for all CMD's.	EXT_STS	USINT	Extended status. Not used for all CMD's.
PCCC_ params	ARRAY of USINT	CMD/FNC specific parameters	PCCC_ results	ARRAY of USINT	CMD/FNC specific result data

Logic Command/Status Words

Appendix D provides the definitions of the Logic Command/Logic Status words that are used for some products that can be connected to the DeviceNet adapter. If you do not see the Logic Command/Logic Status for the product that you are using, refer to your product's documentation.

PowerFlex 4 and PowerFlex 40 Drives

Logic Command Word

Logic Bits																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	**Command**	**Description**
															x	Stop	0 = Not Stop 1 = Stop
														x		Start*	0 = Not Start 1 = Start
													x			Jog	0 = Not Jog 1 = Jog
												x				Clear Faults	0 = Not Clear Faults 1 = Clear Faults
										x	x					Direction	00 = No Command 01 = Forward Command 10 = Reverse Command 11 = Change Direction (toggle)
									x							Not used	
								x								MOP Increment	0 = Not Increment 1 = Increment
						x	x									Accel Rate	00 = No Command 01 = Accel Rate 1 Command 10 = Accel Rate 2 Command 11 = Hold Accel Rate
				x	x											Decel Rate	00 = No Command 01 = Decel Rate 1 Command 10 = Decel Rate 2 Command 11 = Hold Decel Rate
	x	x	x													Reference Select	000 = No Command 001 = Freq Source = Select 010 = Freq Source = Int. Freq 011 = Freq Source = Comm 100 = Preset Freq 1 101 = Preset Freq 2 110 = Preset Freq 3 111 = Preset Freq 4
x																MOP Decrement	0 = Not Decrement 1 = Decrement

* A 0 = Not Stop condition (logic 0) must first be present before a 1 = Start condition will start the drive.

PowerFlex 4 and PowerFlex 40 Drives

Logic Status Word

Logic Bits																	
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	**Status**	**Description**
															x	Ready	0 = Not Ready 1 = Ready
														x		Active	0 = Not Active 1 = Active
													x			Command Direction	0 = Reverse 1 = Forward
												x				Actual Direction	0 = Reverse 1 = Forward
											x					Accel	0 = Not Accelerating 1 = Accelerating
										x						Decel	0 = Not Decelerating 1 = Decelerating
									x							Alarm	0 = No Alarm 1 = Alarm
								x								Fault	0 = No Fault 1 = Fault
							x									At Speed	0 = Not At Reference 1 = At Reference
						x										Main Freq	0 = Not Controlled By Comm 1 = Controlled By Comm
					x											Operation Command	0 = Not Controlled By Comm 1 = Controlled By Comm
				x												Parameters	0 = Not Locked 1 = Locked
			x													Digital Input 1 Status	
		x														Digital Input 2 Status	
	x															Digital Input 3 Status	
x																Digital Input 4 Status	

A

Adapter

Devices such as drives, controllers, and computers usually require an adapter to provide a communication interface between them and a network such as DeviceNet. An adapter reads data on the network and transmits it to the connected device. It also reads data in the device and transmits it to the network.

The 20-COMM-D DeviceNet adapter is an adapter that connects, PowerFlex drives to a DeviceNet network. Adapters are sometimes also called “cards,” “embedded communication options,” “gateways,” “modules,” and “peripherals.”

Automatic Device Replacement (ADR)

A means for replacing a malfunctioning device with a new unit, and having the device configuration data set automatically. The DeviceNet scanner is set up for ADR using RSNetWorx. The scanner uploads and stores a devices configuration. Upon replacing a malfunctioning device with a new unit (node 63), the scanner automatically downloads the configuration data and sets the node address.

B

Bus Off

A bus off condition occurs when an abnormal rate of errors is detected on the Control Area Network (CAN) bus in a device. The bus-off device cannot receive or transmit messages on the network. This condition is often caused by corruption of the network data signals due to noise or data rate mismatch.

C

Change of State (COS) I/O Data Exchange

A device that is configured for Change of State I/O data exchange transmits data at a specified interval if its data remains unchanged. If its data changes, the device immediately transmits the change. This type of exchange can reduce network traffic and save resources since unchanged data does not need to be transmitted or processed.

Class

A class is defined by the DeviceNet specification as “a set of objects that all represent the same kind of system component. A class is a generalization of an object. All objects in a class are identical in form and behavior, but may contain different attribute values.”

Controller

A controller, also called programmable logic controller, is a solid-state control system that has a user-programmable memory for storage of instructions to implement specific functions such as I/O control, logic, timing, counting, report generation, communication, arithmetic, and data file manipulation. A controller consists of a central processor, input/output interface, and memory. See also Scanner.

Cyclic I/O Data Exchange

A device configured for Cyclic I/O data exchange transmits data at a user-configured interval. This type of exchange ensures that data is updated at an appropriate rate for the application, preserves bandwidth for rapidly-changing devices, and allows data to be sampled at precise intervals for better determinism.

D

Data Rate

The data rate is the speed at which data is transferred on the DeviceNet network. The available data rates depend on the type of cable and total cable length used on the network:

	Maximum Cable Length		
Cable	**125 K**	**250 K**	**500 K**
Thick Trunk Line	500 m (1,640 ft.)	250 m (820 ft.)	100 m (328 ft.)
Thin Trunk Line	100 m (328 ft.)	100 m (328 ft.)	100 m (328 ft.)
Maximum Drop Length	6 m (20 ft.)	6 m (20 ft.)	6 m (20 ft.)
Cumulative Drop Length	156 m (512 ft.)	78 m (256 ft.)	39 m (128 ft.)

Each device on a DeviceNet network must be set for the same data rate. You can set the DeviceNet adapter to 125 K, 250 K, or 500 K. You can set it to Autobaud if another device on the network has set the data rate.

DeviceNet Network

A DeviceNet network uses a producer/consumer Controller Area Network (CAN) to connect devices (for example, controllers, drives, and motor starters). Both I/O and explicit messages can be transmitted over the network. A DeviceNet network can support a maximum of 64 devices. Each device is assigned a unique node address and transmits data on the network at the same data rate.

A cable is used to connect devices on the network. It contains both the signal and power wires. Devices can be connected to the network with drop lines, in a daisy chain connection, or a combination of the two.

General information about DeviceNet and the DeviceNet specification are maintained by the Open DeviceNet Vendor's Association (ODVA). ODVA is online at http://www.odva.org.

DSI

Drive Serial Interface - a modification of the ModBus RS-485 serial communication protocol used by various Allen-Bradley drives and power products.

DSI Peripheral

A device that provides an interface between DSI and a network or user. Peripheral devices are also referred to as "adapters" and "modules." The serial converter and PowerFlex 4-Class HIMs (22-HIM-*) are examples of DSI peripherals.

DSI Product

A device that uses the DSI communications interface to communicate with one or more peripheral devices. For example, a motor drive such as a PowerFlex 4-Class drive is a DSI product. In this manual, a DSI product is also referred to as "product" or "host."

DriveExplorer Software

DriveExplorer software is a tool for monitoring and configuring Allen-Bradley products and adapters. It can be run on computers running Microsoft Windows 95, Windows 98, Windows NT (version 4.0 or greater), and Windows CE (version 2.0 or greater) operating systems. DriveExplorer (version 3.xx) can be used to configure this adapter and PowerFlex 4-Class drives. Information about DriveExplorer software and a free lite version can be accessed at http://www.ab.com/drives/driveexplorer.

DriveTools Software

A software suite designed for Microsoft Windows 95, Windows 98, and Windows NT (4.0 or greater) operating systems. This software suite provides a family of tools that you can use to program, monitor, control, troubleshoot, and maintain Allen Bradley products. DriveTools 2000 (version 1.xx) can be used with PowerFlex drives. Information about DriveTools can be accessed at http://www.ab.com/drives.

E

Electronic Data Sheet (EDS) Files

EDS files are simple text files that are used by network configuration tools such as RSNetWorx for DeviceNet to describe products so that you can easily commission them on a network. EDS files describe a product device type, revision, and configurable parameters. EDS files for many Allen-Bradley products can be found at http://www.ab.com/networks/eds.

Explicit Messaging

Explicit Messages are used to configure, monitor, and diagnose devices over DeviceNet.

F

Fault Action

A fault action determines how the adapter and connected product act when a communications fault (for example, a cable is disconnected) occurs or when the scanner is switched out of run mode. The former uses a communications fault action, and the latter uses an idle fault action.

Fault Configuration

When communications are disrupted (for example, a cable is disconnected), the adapter and PowerFlex drive can respond with a user-defined fault configuration. The user sets the data that is sent to the drive in the fault configuration parameters (**Parameter 10 - [Flt Cfg Logic]** and **Parameter 11 - [Flt Cfg Ref]**). When a fault action parameter is set to use the fault configuration and a fault occurs, the data from these parameters is sent as the Command Logic and/or Reference.

Faulted Node Recovery

This DeviceNet feature lets you change a configuration of a device that is faulted on the network. For example, if you add a device to a network and it does not have a unique address, it will fault. If you have a configuration tool that supports faulted node recovery and your adapter is using parameters to set its node address and data rate, you can change the node address.

Flash Update

The process of updating firmware in the adapter. The adapter can be flash updated using the X-Modem protocol and a 1203-SSS Smart Self-powered Serial converter (firmware 3.xx).

H

Heartbeat Rate

The heartbeat rate is used in Change of State (COS) data exchange. It is associated with producing data once every EPR (Expected Packet Rate) duration. There may be four heartbeats before a time-out happens.

HIM (Human Interface Module)

A device that can be used to configure and control a PowerFlex 4-Class drive. PowerFlex 4-Class HIMs (22-HIM-*) can be used to configure connected peripherals.

Hold Last

When communications are disrupted (for example, a cable is disconnected), the adapter and PowerFlex drive can respond by holding last. Hold last results in the drive receiving the last data received via the DeviceNet connection before the disruption. If the drive was running and using the Reference from the adapter, it will continue to run at the same Reference.

I

I/O Data

I/O data, sometimes called “implicit messages” or “input/output,” transmit time-critical data such as a Logic Command and Reference. The terms “input” and “output” are defined from the scanner’s point of view. Output is transmitted by the scanner and consumed by the adapter. Input is transmitted by the adapter and consumed by the scanner.

L

Logic Command/Logic Status

The Logic Command is used to control the PowerFlex drive (e.g., start, stop, direction). It consists of one 16-bit word of input to the adapter from the network. The definitions of the bits in this word depend on the drive.

The Logic Status is used to monitor the PowerFlex drive (for example, operating state, motor direction). It consists of one 16-bit word of output from the adapter to the network. The definitions of the bits in this word depend on the drive.

N

Node Address

A DeviceNet network can have as many as 64 devices connected to it. Each device on the network must have a unique node address between 0 and 63. Node address 63 is the default used by uncommissioned devices. Node addresses are sometimes called “MAC IDs.”

NVS (Non-Volatile Storage)

NVS is the permanent memory of a device. Devices such as the adapter and drive store parameters and other information in NVS so that they are not lost when the device loses power. NVS is sometimes called “EEPROM.”

O

Objects

The DeviceNet specification defines an object as “an abstract representation of a particular component within a product.”

P

PCCC (Programmable Controller Communications Command)

PCCC is the protocol used by some controllers to communicate with devices on a network. Some software products (for example, DriveExplorer and DriveTools 2000) also use PCCC to communicate.

Polled I/O Data Exchange

A device that is configured for polling I/O data exchange sends data immediately after it receives a request for the data. For example, an adapter receives a Logic Status Command from the scanner and then sends the Logic Status of the connected PowerFlex drive.

PowerFlex 4-Class Drives

The Allen-Bradley PowerFlex 4-Class family of drives include the PowerFlex 4 and PowerFlex 40. These drives can be used for applications ranging from 0.2 kW (0.25 HP) to 7.5 kW (10 HP). All PowerFlex 4-Class drives implement DSI, allowing those that support an internal adapter to use the 22-COMM-D DeviceNet adapter. The adapter can be installed in a PowerFlex 40 drive but not in the PowerFlex 4. This manual focuses on using the adapter with a PowerFlex 40 drive.

Producer/Consumer Network

On producer/consumer networks, packets are identified by content rather than an explicit destination. If a node needs the packet, it will accept the identifier and consume the packet. The source therefore sends a packet once and all the nodes consume the same packet if they need it. Data is produced once, regardless of the number of consumers. Also, better synchronization than Master-Slave networks is possible because data arrives at each node at the same time

R

Reference/Feedback

The Reference is used to send a Reference (for example, speed, frequency, torque) to the product. It consists of one word of input to the adapter from the network. The size of the word (either a 16-bit word or 32-bit word) is determined by the drive.

Feedback is used to monitor the speed of a product. It consists of one word of output from the adapter to the network. The size of the word (either a 16-bit word or 32-bit word) is determined by the drive.

RSNetWorx for DeviceNet

RSNetWorx for DeviceNet software is a tool for configuring and monitoring DeviceNet networks and connected devices. It is a 32-bit Windows application that runs on Windows 95, Windows 98, and Windows NT. Information about RSNetWorx for DeviceNet software can be found at http://www.software.rockwell.com/rsnetworx.

S

Scanner

A scanner is a separate module (of a multi-module controller) or a built-in component (of a single-module controller) that provides communication with adapters connected to a network. See also Controller.

Status Indicators

Status indicators are LEDs that are used to report the status of the adapter, network, and drive. They are on the adapter and can be viewed on the front cover of the drive when the drive is powered.

T

Type 0/Type 1/Type 2 Control

When transmitting I/O, the adapter can use different types of messages for control. The Type 0, Type 1, and Type 2 events help Allen-Bradley personnel identify the type of messages that an adapter is using.

U

UCMM (UnConnected Message Manager)

UCMM provides a method to create connections between DeviceNet devices.

Z

Zero Data

When communications are disrupted (for example, a cable is disconnected), the adapter and drive can respond with zero data. Zero data results in the drive receiving zero as values for command data. If the drive was running and using the Reference from the adapter, it will stay running but at zero Reference.

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